

# METAL PRODUCTS MANUFACTURING

# MPM

**Serving the Appliance and  
Fabricated Metal Products Industry**

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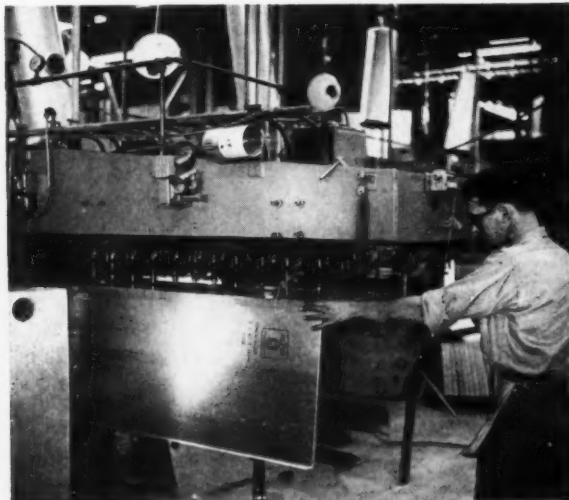
**OCTOBER 1961**



Compact Dishwasher Provides Installation Flexibility — Page 44



Custom Finishing in 22 Standard Colors — Page 46



Fabricating at Assembly Line Reduces Parts Handling — Page 37



**Wider Range  
of  
Gas Heat  
Control  
now available  
from  
Robertshaw**

Equipment designers now have a wider temperature range . . . from 150° to 700°F . . . in which to design and operate gas-fired equipment and appliances . . . with full control at any point in the temperature range.

The perfection of a combination snap and throttle thermostat, Robertshaw's **FLAME MASTER FD** gives flat-line control from 300° up . . . and very modest fluctuations in the low range, with full control down to 150°. Even the *minimum* flame setting is under thermostatic control.

With Robertshaw's **FLAME MASTER FD** also comes wide adaptability of installation through design flexibility to meet your product's physical requirements.

Robertshaw engineers will be glad to review the temperature control requirements of your new product design in the strictest confidence.

**FLAME MASTER FD** could well be the temperature control you need. Write Robertshaw Thermostat Division, Robertshaw-Fulton Controls Company, Youngwood, Pennsylvania. (Plant located at New Stanton.) For real fast service, use **DIRECT DISTANCE DIALING**. Dial 412-242-7171.

VMA 9023-R



. . . the name that **MEANS** temperature control

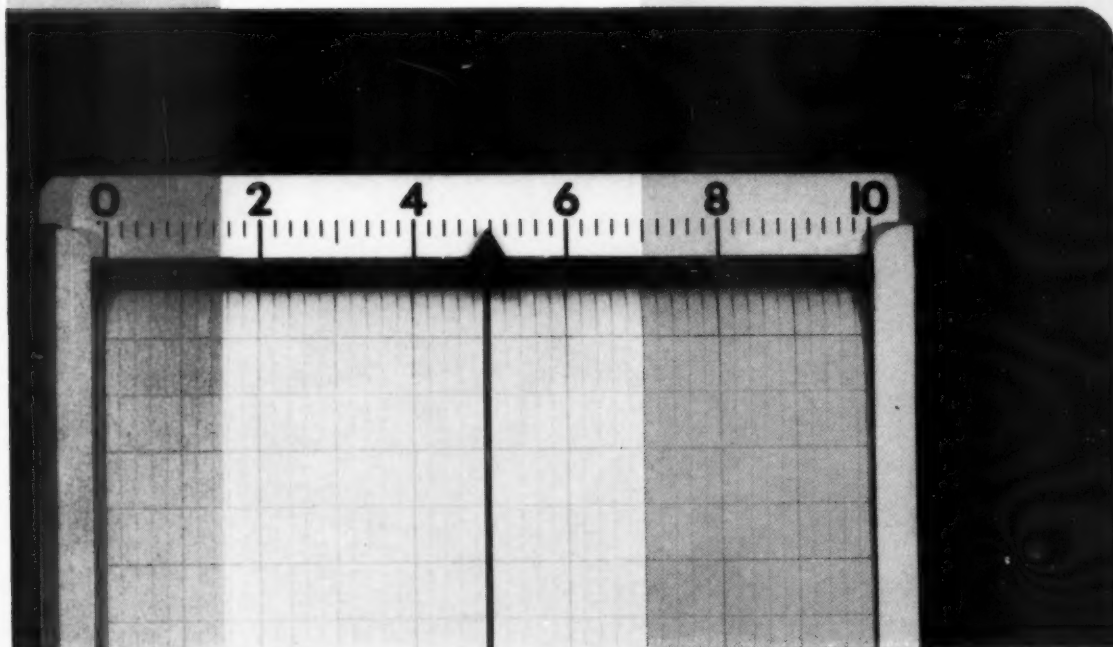


Photo of Speedo-Max Recorder courtesy Leeds & Northrup Company

Circle No. 354 on Reader Service Card.



## How to Protect Hidden Parts from Corrosion at Less Cost

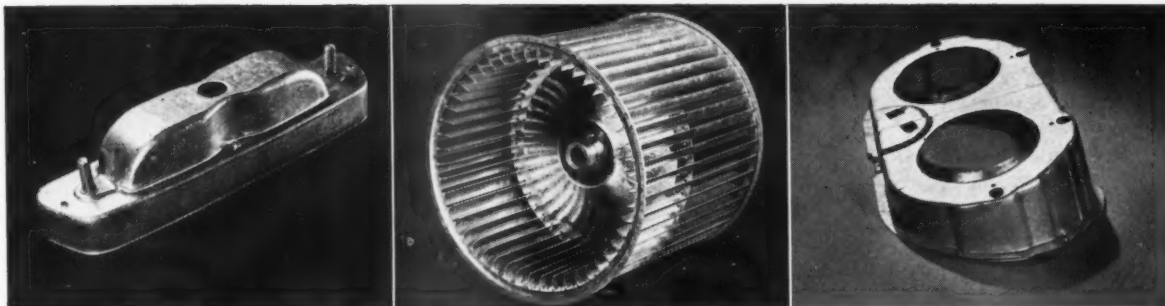
If you paint or plate concealed structural parts for corrosion resistance, chances are you can save money by changing to Armco ZINCGRIP® Steel. With this hot-dip zinc-coated steel, parts can go directly from press line to assembly line, eliminating costly, time-consuming painting or plating operations.

Armco ZINCGRIP provides a full weight zinc coating on both sides that takes as much forming or drawing as the base metal without flaking or peeling. The zinc coating *stretches* with the base metal.

The table gives an idea of the savings possible with ZINCGRIP Steel. For more complete information, write for our application bulletin. **Armco Division, Armco Steel Corporation, 2931 Curtis Street, Middletown, Ohio.**



Capitalize on high customer acceptance of steel; put the distinctive Steelmark on the products you make.



New steels are  
born at  
Armco

### Check these cost comparisons

Steel Thickness	Cost of* ZINCGRIP Coating c/sq. ft. of sheet	Typical** Cost of Painting c/sq. ft. of sheet	Savings with ZINCGRIP c/sq. ft.
.025	1.83c	3.25c	1.42c
.050	2.72	3.25	.53
.075	2.51	3.25	.74
Average ...	2.35c	3.25c	.90c

\*Coated both sides

\*\*Painted both sides

Computations based on coils 24" to 36" wide. ZINCGRIP coating costs are additional costs beyond price of cold-rolled steel. Paint costs are figured on typical dip-painting or flow-coating methods and include cost of metal preparation, paint, labor and overhead of painting operations. Some paint costs are lower than these; many are more.



**Armco Division**

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# **ONE** STANDARD SCREW REPLACES MOST THREAD-CUTTING AND THREAD-FORMING SCREWS



# **NEW**



## **TAPPING SCREW**

with **LOW** drive torque...

**HIGH** strip torque

Square point provides 4 points of contact • Starts straighter • Offers chip-free driving • Low drive torque with high strip torque • Resists vibration ... won't loosen • Uses same lead hole • Replaces most types of thread-cutting and thread-forming screws ... simplifies inventory ... assures better price break.

Available in standard head styles, finishes and sizes ... for unlimited applications • Compare features, tests, advantages and prices ...

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CABINET HARDWARE • LOCKS • PLASTICS • FASTENERS • APPLIANCE HARDWARE...ALL FROM ONE SOURCE

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## METAL PRODUCTS MANUFACTURING

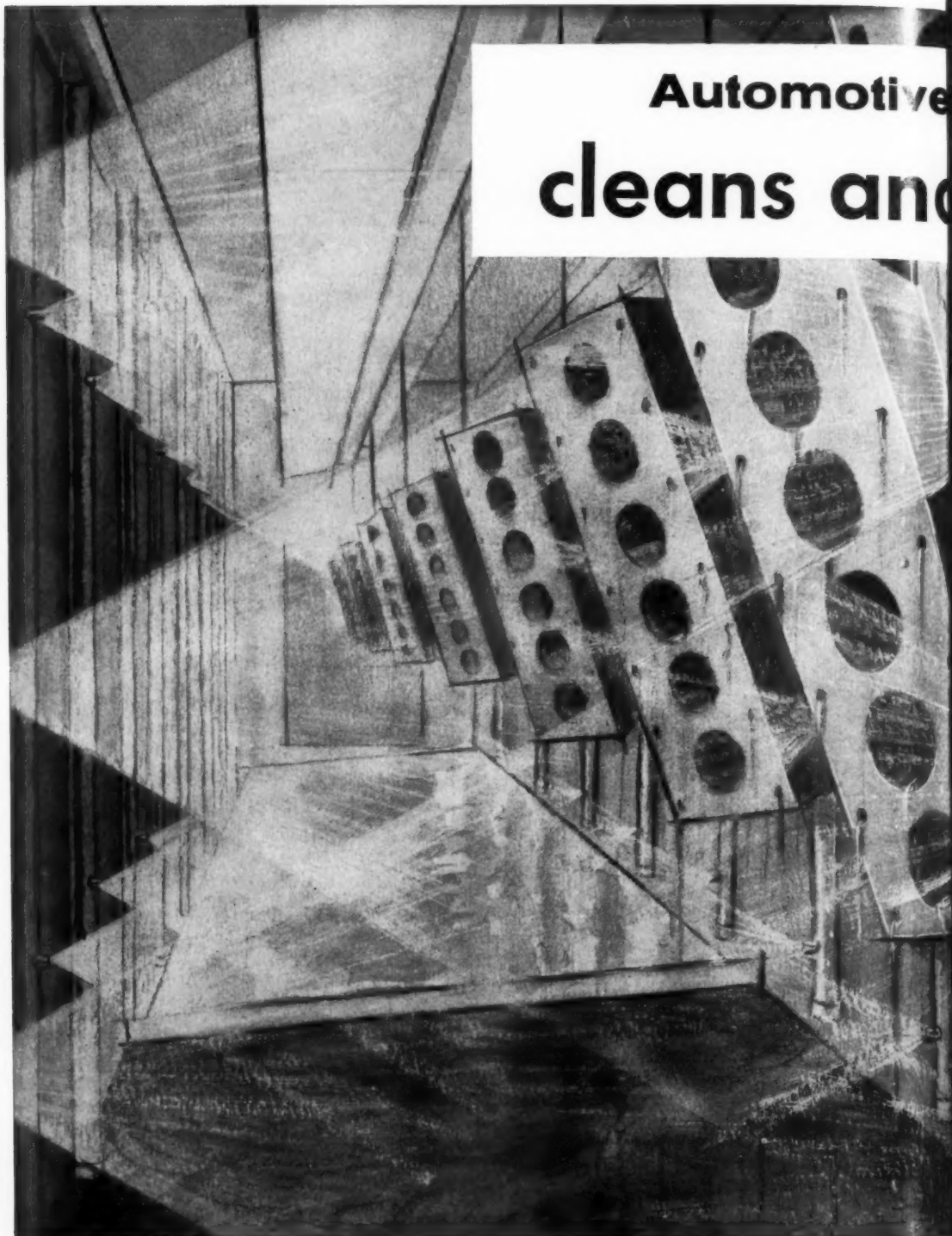
FROM RAW METAL TO FINISHED PRODUCT

A trade publication devoted to the interests of the metal products manufacturing industry with special editorial attention to home appliances. The editorial scope covers design, engineering, market and statistical information and technical and practical information on plant facilities and all phases of manufacturing "from raw metal to finished product." Free controlled circulation to top management, sales management, purchasing, engineering and key plant management and supervision in metal product manufacturing plants. To others, subscription price is \$10.00 per year, domestic. To all other countries \$15.00 per year (U.S. funds). Single copies, \$1.00.

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cleans and P**

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and prevent  
rusting*

**ask Oakite**

OVER 50 YEARS CLEANING EXPERIENCE • OVER 250 FIELD SERVICE MEN • OVER 160 MATERIALS

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iveapproved Oakite 198

# PREVENTS RUST, too

*... thoroughly washes in-process parts*

*... provides temporary protection against rust*

Two essential jobs in one—that's what spray washing with Oakite 198 is presently doing in the automotive industry. It thoroughly, speedily removes machining and shop soils from processed parts. Then it assures that the freshly machined surfaces will remain unmarred by rust right up to assembly time. It does this by leaving a streak-free residual protective film that does not interfere with visual inspection, and which need not be removed.

Oakite 198 satisfies the industry's exacting production standards for high cleaning efficiency with safety. It clears away even heavy soils when operated at temperatures up to 180°F.

Light soils can be eliminated with room temperature operation if desired. Even metal chips disappear under its efficient detergent activity.

Along with smut-free cleaning and rust-protection goes economy. Oakite 198 is being used with water at concentrations between 1% and 5% by volume. It proves effective whether used in single or multi-stage washing machines.

To get more from your spray washer—ask Oakite. There's a complete line of materials to give you what you want in low unit cost cleaning alone—or combined with rust-prevention or paint-bonding phosphating. Send for Bulletin B-7484.

Write Oakite Products, Inc., 58 Rector Street, New York 6, N. Y.



## **Oakite Special Protective Oil A Polar Rust Preventive**

This oil works by displacing water. Cleaned ferrous parts can therefore be dipped into a tank of Oakite Special Protective Oil right after the rinse. No drying needed. The oil film removes finger marks, does not stain the machined surfaces or change dimensions. It drains rapidly for economy, and disappears quickly with regular cleaning methods. Send for data sheet F-9835.



## **Oakite Steel Preserver safeguards metal indoors and outdoors**

Onset of highly humid weather or lengthy exposures of ferrous parts to rusting conditions calls for the extra protection of Oakite Steel Preserver. It gives parts lasting and reliable protection during shipping and storage. Users find it far easier to apply and to remove than most permanent-type rust preventives. Send for data sheet F-9835.

## PORCELAIN ENAMEL BEAUTY

Metalwash driven roller spray pickler prepares home laundry washing machine tops for enamel coating.

## begins BENEATH the SURFACE



### SPRAY PICKLING SYSTEM

(Cycles vary to meet specific requirements.)

OPERATION	TIME	TEMP. F
Hot Alkali Spray Wash	1 min.	180°
Hot Rinse to Sewer	1 1/4 min.	180°
Hot Recirculated Rinse		
Hot Fresh Water Rinse		
Hot Alkalai Spray Wash	3 min.	180°
Hot Rinse to Sewer	1 1/4 min.	180°
Hot Recirculated Rinse		
Hot Fresh Water Rinse		
Hot Sulphuric Acid Pickle	5 min.	180° max.
Cold Recirculated Spray Rinse	1 min.	
*Hot Nickle Sulphate Spray Coat	6 min.	180°
Cold Recirculated Spray Rinse	1 min.	180°
Hot Neutralizing Spray	1 1/2 min.	180°
Hot Neutralizing Spray	1 1/2 min.	180°
Hot Blast Dry	4 min.	300°

\*Metalwash U.S. Pat. 2570299

The gleaming surface beauty of today's porcelain enameled appliances is more than skin deep. It begins beneath the surface—with scientific cleaning, pickling and nickle coating of the metal to remove every possible cause of blemish and rejection.

Metalwash originated and perfected continuous, automatic spray pickling for the appliance industry. Metalwash automatic spray pickling systems, each engineered to the specific need of the appliance manufacturer, are in use in more than a dozen great assembly lines.\* More are being built on order for leading U. S. and Canadian manufacturers who recognize the superior, lower-cost performance of Metalwash machines.

**It's the shining enamel surface that clinches the appliance sale—and the sale begins beneath the surface with Metalwash!**

\*Metalwash experience and engineering skill can improve your enamel surfaced product. We'll be happy to tell you how and to show you Metalwash spray pickling systems in actual operation. Write today for sample plans and specifications.

INDUSTRIAL DIVISION



Established 1926

900 North Avenue Elizabeth 4, New Jersey

Creative leader in engineering and manufacture of better systems for cleaning, pickling, phosphating, drying and other metal processing.



Metalwash manual system



Metalwash driven roller system



Metalwash manual system



Metalwash manual system



Metalwash driven roller system

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## APPLIANCE PRICES TOO HIGH OR TOO LOW??

REUBEN E. SLESINGER, professor of economics, University of Pittsburgh, was recently quoted on the subject of appliances under the heading, "Economist Sees No Upturn in Appliance Sales — Predicts 'Several Years Before Revival.'" The editor of MPM isn't about to take issue with a professor of economics on questions of economic growth, population trends, expenditures for durable and non-durable goods, etc., but there is a point or two which we think bears consideration by appliance manufacturers.

Following a review of the economic situation as it affects appliances and a review of appliance production drops percentage-wise, Professor Slesinger is quoted as questioning: "What can the appliance dealer do to buoy up his sales at this time?" He indicates that further liberalization of installment terms is not the answer, and states: "What is needed then is a development of new frontiers in this market," with the following detailed explanation (our italics):

"A tremendous amount of mutual cooperation between many forces is necessary. The American market, not to say anything about export markets, is far from saturated with appliances and durables. But it is resisting purchases at current prices. *The hope and challenge appears to be in reducing the prices of these items so that customers might reenter the buying markets.* But to do so means a number of things — government must have a more realistic tax policy, not only over profits but with internal matters such as depreciation as well. Labor must recognize its role as a cost factor and become more efficient so that real wages may be raised as per unit production costs are lowered. Management must assume a responsibility to integrate all of these forces and *give the public lower prices so that goods may be moved*, thereby increasing output and employment, and consequently generating increased purchasing power.

The quotation continues: "The problem is not unique to the durable consumer goods producers. It permeates all of American industry at this time. The individual seller may find it hard to do much in this connection unless the whole industry comes to recognize its responsibilities. *So far as*

*the individual seller is concerned, his best hope continues to be in an approach of positive selling and continuously generating new techniques of creative selling, but not to oversell so that he suffers a decline that countervails his earlier profits."*

Speaking as one who claims no intimate knowledge of the science of economics, but who has spent over 30 years in the appliance industry, I can agree most heartily with the statement, "So far as the individual seller is concerned, his best hope continues to be in an approach of positive selling and continuously generating new techniques of creative selling . . ."

However, when we read the following: "The hope and challenge appears to be in reducing the prices . . ." and "give the public lower prices so that goods may be moved . . ." we wonder how much research was conducted in the appliance field before these statements were made.

We believe that most management men who make their livelihood from the production and sale of household appliances will agree that the unhealthy situation in the appliance industry today is, in a large measure, the direct result of prices that are too low, not too high. It's hard to see how Professor Slesinger plans this sorely needed constructive selling, if products are to be priced below those on the current market — a market which, in many instances, cannot support a reasonable profit to the manufacturer and distributing channels.

We believe that the statesmen in the appliance industry have long since turned their backs on the idea that one answer to a prosperous appliance field is to price low, low, low in order to achieve high, high, high output — and employment. We'd rather see production stabilized, if necessary, in order to maintain a stable market so that those who are employed, whether they be management or factory employees — and stockholders — may get a *reasonable* return on each unit sold.

*See the November issue of MPM for a guest editorial on the subject by W. A. Wendler, vice president-sales, Amana Refrigeration.*

*Dana Chase*

EDITOR AND PUBLISHER



# Her Eyes Are Open

So let her see...with glass by **MARSCO**



At the coin-op laundry or at home, Mrs. Home Laundress uses those eyes of hers. They are continually checking the progress of her washing or drying operation. What more logical design features for home or commercial equipment . . . washer or dryer . . . than MARSCO'S PORTA-VUE and MARSCO'S CONTROL VUE.

Design your equipment with MARSCO'S PORTA-VUE window and MARSCO'S CONTROL-VUE backguard glass . . . twin "Vues" she'll appreciate.

#### SOME OF MARSCO'S HEAT-TREATED, TEMPERED AND HARDENED GLASS PARTS:

- CLOCK & TIMER CRYSTALS
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- INSTRUMENTS
- SHELVEING
- ROTISSERIES
- DRYERS
- DIALS AND NAME PLATES
- TELEVISION EQUIPMENT
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- WATER HEATER PEEP SIGHTS

Special Shapes for: Instruments, Gauges, Household and Industrial Appliances.

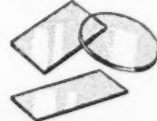
**Marsco**



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Convex Glass



Heat-treated Glass

**MARSCO MFG. CO., 2901 S. HALSTED ST., CHICAGO 8, ILL.**

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ANNOUNCING...

# New "Thrift Grade"

## ORNAMENTAL STAINLESS STEEL TUBING by **WALLINGFORD**

offering you the

**LASTING BEAUTY AND CORROSION  
RESISTANCE OF STAINLESS STEEL**

at a **NEW LOW COST...**

**COMPARABLE TO THAT OF SOME  
CHROME-PLATED TUBE**

This new "Thrift-Grade" Stainless Steel Tubing can be offered at prices so low that they compare favorably with those of chromium plated tubing because Wallingford has recently installed new high speed production facilities that reduce our manufacturing costs.

You can take advantage of these low prices right now, because Wallingford is ready to ship "Thrift-Grade" Tubing **FROM STOCK** — in a wide range of standard sizes. Contact Wallingford Steel or fill in this card for the address of the closest distributor stock.

**SEE REVERSE SIDE FOR ADDITIONAL DATA**

**W** *Progress in Metals for Over 38 Years*  
**THE WALLINGFORD STEEL CO.**  
WALLINGFORD, CONNECTICUT, U.S.A.

**COLD ROLLED STRIP:** Super Metals, Stainless, Alloy

**WELDED TUBES AND PIPE:** Super Metals, Stainless, Alloy

For complete information on, and sample of, "Thrift-Grade" Stainless Steel Tubing... fill in and mail this card today!

YES—I would like more complete information on Wallingford's new "Thrift-Grade" Tubing:

- ☐ Please send me the address of the closest distributor stock.
- ☐ Please send me a sample of "Thrift-Grade" Tubing and "Thrift-Grade" Prices.
- ☐ Please send my free copy of the new 24-page circular, providing full information on all grades and sizes of tubing produced by Wallingford Steel Co.

NAME \_\_\_\_\_ TITLE \_\_\_\_\_

COMPANY \_\_\_\_\_

CO. ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ ZONE \_\_\_\_\_ STATE \_\_\_\_\_



Here are  
the **MONEY-**  
**SAVING FACTS** on

## **WALLINGFORD'S**

**New, Low-Cost "THRIFT-GRADE"**  
**Ornamental Stainless Steel Tubing**

### **TUBING GRADE and TOLERANCES**

Wallingford "Thrift-Grade" is ornamental grade tubing produced from austenitic stainless steel strip of the highest quality. Tubing prices are quoted on the basis of OD and wall thickness only; no ID tolerances are specified.

### **FABRICATION**

Bending qualities for Wallingford "Thrift-Grade" Tubing are similar to those provided by any other ornamental grade tubing.

### **STANDARD SIZES and AVAILABILITY**

Prompt shipments are made **FROM STOCK** — in the following standard sizes:

OD	GAGES	OD	GAGES
3/8"	20, 18 and 16	1 5/8"	20, 18, 16 and 14
1/2"	20, 18 and 16	1 3/4"	20, 18, 16 and 14
1"	20, 18, 16 and 14	1.900"	20, 18, 16 and 14
1 1/4"	20, 18, 16 and 14	2"	20, 18, 16 and 14
1 1/2"	20, 18, 16 and 14		

For complete information, and free sample — fill in and mail this card today!

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PERMIT NO. 116  
Wallingford, Conn.

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No Postage Stamp Necessary If Mailed in the United States

— POSTAGE WILL BE PAID BY —

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Wallingford, Connecticut

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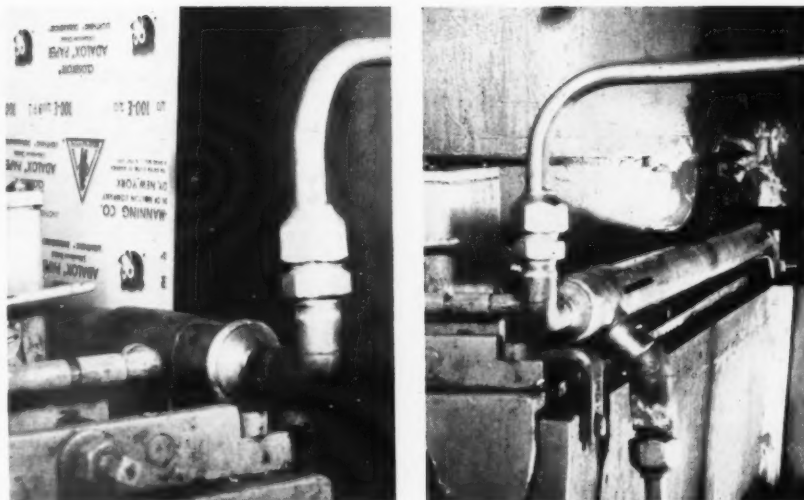
## Inexpensive humidifier flattens abrasive belts

**A** LOW-COST HUMIDIFIER that prevents edge cupping or curling of coated abrasive belts in dry atmospheres has been developed by engineers at Behr-Manning Co., a division of Norton Co. It is intended for easy in-plant fabrication by belt users. Advantages include increased belt life, the ability to exert higher grinding pressures, and improved grinding and finishing performance.

### Belts tend to curl

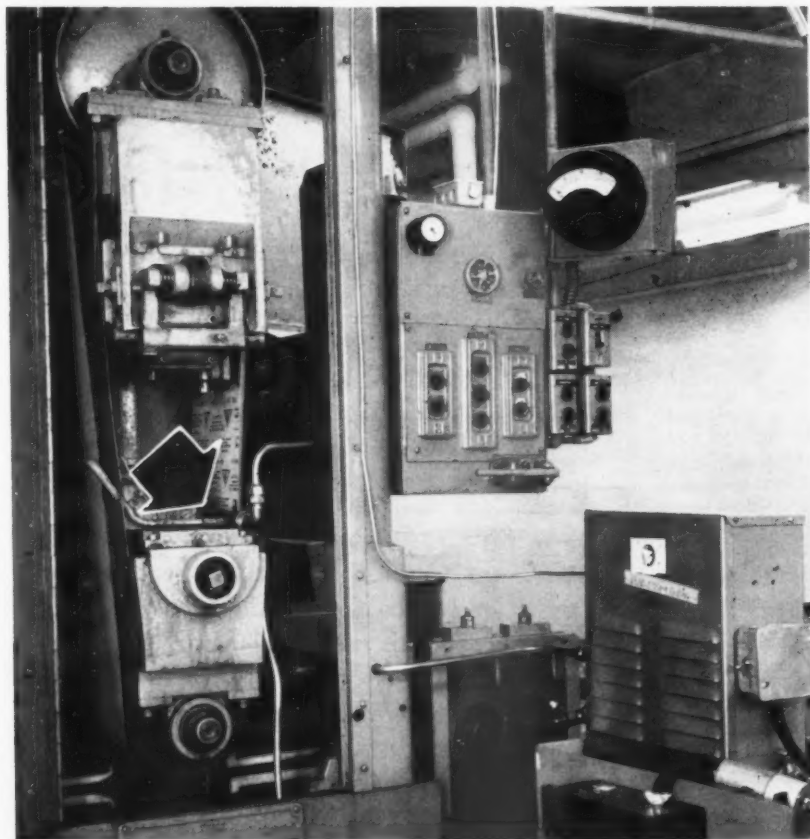
As with most coated cloth or paper materials of similar dimensions, abrasive belts tend to curl at the edges if operated in low humidity that may prevail in winter. To remedy this condition, a slotted copper tube of 1 1/4-in. inner diameter and as long as the belt is wide, is mounted close to the back of the belt, bathing the belt edges lightly with dry steam from the plant supply or a portable steam generator.

The two slots in the tube are 1/8 in.



(Left) — Note the abrupt curl at the edge of this paper belt. It ran perfectly flat after being steamed for less than a minute. (Right) — With the coated abrasive belt removed from the grinder, slots in the humidifier tube appear clearly. The pipe leading downward from the tee allows condensation to drain off from the humidifier tube.

The humidifying unit installed (arrow). A portable electrical steam generator is at right.



wide and 4 in. long; for 50-in. belts, slots may be 8 in. long. Within this tube, a 3/8-in. copper tube of the same length is centered, with a line of 1/16-in. holes on 1/2-in. centers. This smaller tube should be oriented so that the small holes are 180° from the slots in the outer tube. Steam is admitted to the small tube by a 3/8-in. fitting at one end, and a drain is rigged from a 1 1/4 by 1 1/4 by 1/2-in. copper tee at the same end of the outer tube.

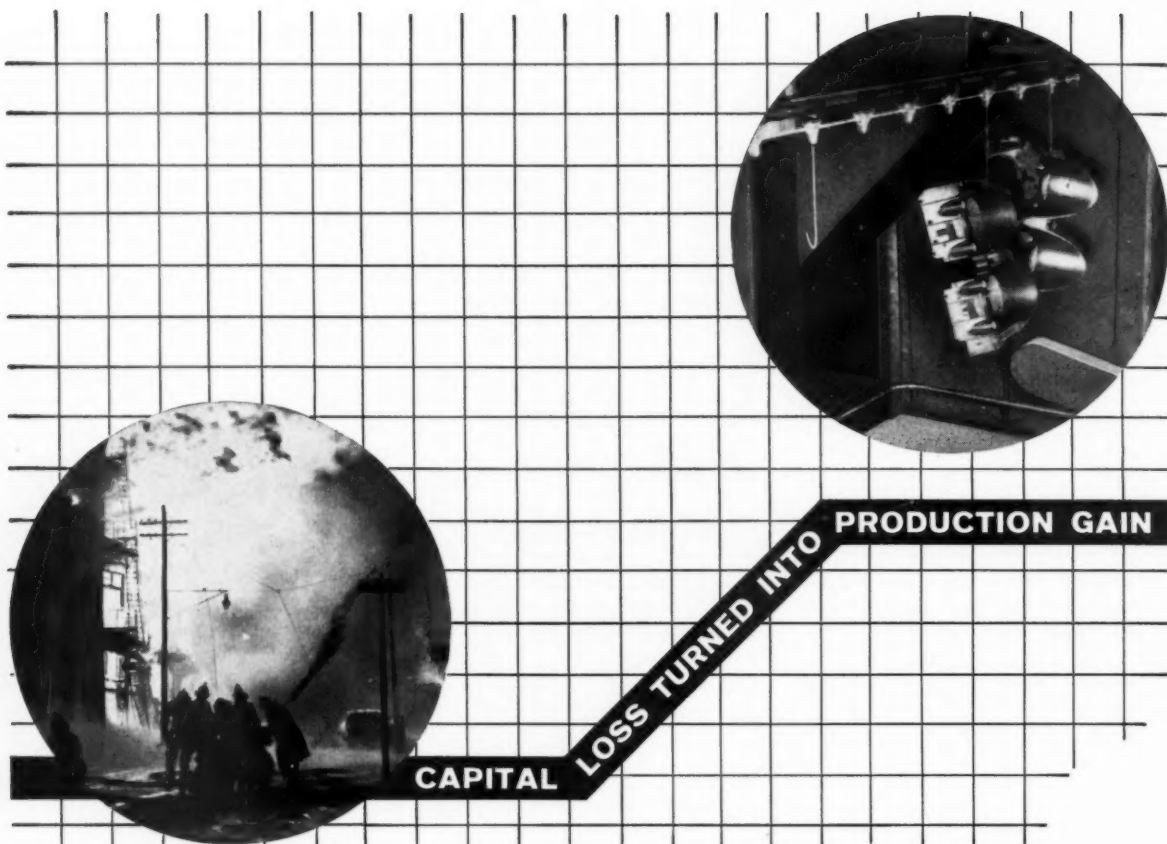
### Steam without condensate

This device will deliver relatively dry steam from the slots, yet condensate water will not reach the belt; instead, it will collect in the bottom of the larger tube and flow out via the drain.

Steady application of a small quantity of steam will flatten a severely curled belt in less than a minute of operation, and will keep it flat. A control valve may be adjusted to furnish the minimum quantity of steam that will hold belt flatness. Normally, the steam will not be visible, nor will it damage the belt or wet the work.

Blueprints of the humidifier are available without charge from the Behr-Manning Product Engineering Dept.





## from plant ruins to production records in sixty days

One of the toughest rebuilding problems confronting the Clements Mfg. Co. when their Deckerville, Mich., plant was completely demolished by fire, was speedy replacement of the finishing system needed for phosphate coating and painting of its diversified line of automotive diecast and sheetmetal parts.

The new system had to be versatile—had to handle many different sizes and shapes. It had to be inexpensive to operate fuel-wise and labor-wise. Above all, it had to be delivered and installed in a matter of a few days—it had to do a high quality job right from the start—and it had to take up little floor space.

Experienced MOCO design and process engineers rose to the challenge.

First, a 3 stage washing machine for phosphating and rinsing was designed and built at the MOCO plant, and shipped completely finished, except for piping hook-up, directly to the Clements Mfg. Co. plant.

Next, MOCO engineers tackled the drying and paint baking problem. A combination Dry-off and Bake Oven was developed that could dry parts as they came from the washing machine on their way to the spray booths, and bake the painted parts as the conveyor returned them to the oven for a longer period before delivery to the conveyor unloading station.



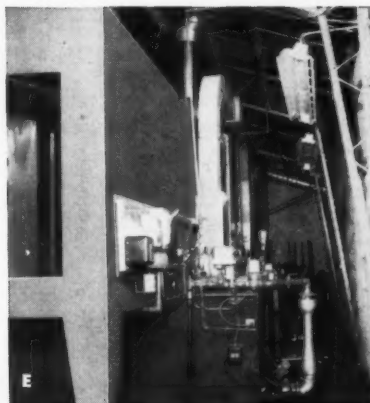
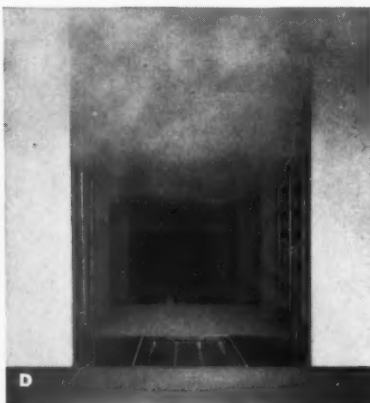
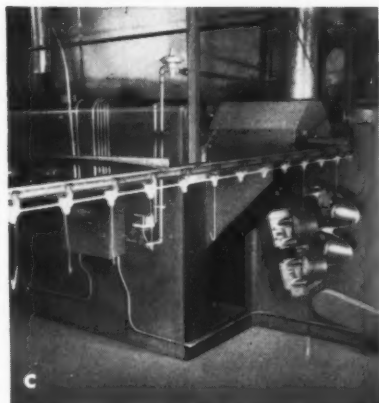
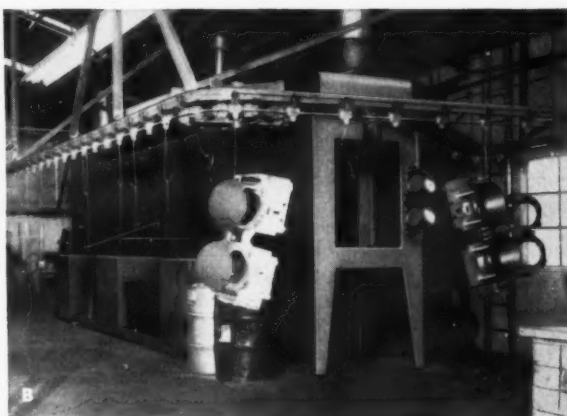
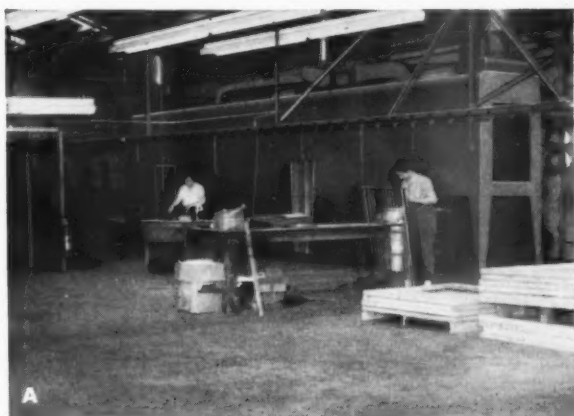
The Dry-off and Bake Oven was too large to ship already assembled, but MOCO's unitized design made assembly at the Clements Mfg. Co. plant a relatively simple matter.

Within 60 days of the disaster, the Clements Manufacturing Company plant was back in full operation with production at a higher level than ever before, thanks to MOCO ingenuity, engineering skill and desire to

serve its customers. MOCO problem-solvers will welcome the opportunity to serve you.

Write for the name of our representative nearest you.

**FREE**—Send for your MOCO bulletin showing typical finishing system applications and specifications; no cost or obligation, of course.



**A**—Sixty days after the Clements Mfg. Co. plant was burned to the ground this finishing system was in operation in the rebuilt plant. In the right foreground workers are loading and unloading parts. Behind them is the MOCO Washing Machine. On the left, paint spray booths hide the MOCO combination dry-off and paint baking oven. **B**—Start of the completely conveyorized finishing cycle. From loading station at left parts enter MOCO 3 stage washing machine for washing,

rinsing and phosphate coating. **C**—Finishing parts coming out of combination dry-off and bake oven on their way to unloading station. **D**—Entrance view of phosphating machine indicating risers, nozzles, street els, drain decks, access walkways, spray zone silhouettes shown immediately after pump stopped. **E**—3 stage MOCO washing machine showing tanks, fill and overflow pipes and valves, pumps, burners, controls and exhaust ducts.

## MICHIGAN OVEN COMPANY



FINISHING EQUIPMENT DEPT. 423 BRAINARD DETROIT 1, MICHIGAN  
WASHING MACHINES • BONDERIZING UNITS • DRY-OFF OVENS • DIP TANKS  
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60-A

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*the facts are indisputable:*

# **SPEED COOKING DOES SELL RANGES!!!**

Since 1950, when PROCTOR introduced the Flasher, the first speed-cooking control, interest in fast heat has grown until it is now acknowledged as the most important feature to all electric range buyers.

Industry reaction was immediate: wattages climbed in an attempt to meet the challenge of PROCTOR. Even with the highest possible wattages, PROCTOR's Instant Heat is still unmatched!

Yes, even today, eleven years later, PROCTOR still leads, with the Instant Heat Control . . . the only practical way of giving the housewife what she wants . . . fast, dependable cooking!

And these facts are indisputable too! Only PROCTOR provides these unequalled advantages:

**FAST**—heating elements are red hot . . . and cooking . . . in as little as 13 seconds!

**SAFE**—no dangerous, "souped-up", high wattage elements are required; wattage automatically cuts back when the element is hot!

**SIMPLE**—one dial setting gives . . . instant heat, then perfect control . . . at any desired level!

**INEXPENSIVE**—costs little more than ordinary switches!

## **YET THERE IS MORE**

Heating is uniform over the entire element . . . input is automatically compensated for ambient temperature variations and voltage changes . . . pilot light circuits are included . . . installations are easier . . . mounting is simple and adaptable to all range designs.

**Make your range appeal indisputable  
... add a Proctor Instant Heat Control.**



**PROCTOR-SILEX CORPORATION**

Controls Division  
4000 Coolidge Avenue  
Baltimore 29, Md.



# **PROCTOR**

Circle No. 350 on Reader Service Card.

The appliance industry in the overall has not faced up to the whole truth in our selling efforts. We too often leave the impression our products are service-free, and while quality is the watchword today more than ever before, a bonus of the long buyer's market, the fact remains that our more complex products, coupled with user abuse, plus our own errors, mean there may be need for service, and I believe we should plan on it and be sure our customers plan on it.—*W. H. Dennler, General Electric.*

If steel workers in the United States are being priced out of their jobs, the responsibility for this lies, truly, not with the owners and management of the steel companies. Rather, we must look to other segments of the nation's economic, social, and political organization to find the causes.—*H. S. Potter, Carpenter Steel Co.*

The public in general—as distinct from the customer in particular—should be informed about significant changes in product or service. The public mind absorbs impressions, some of them slightly out of focus, and its opinion of a company can be the result of a minor neglect or trivial courtesy.—*A. M. Sullivan, Dun's Review.*

If all the money spent individually by the metals groups [in the building field] could be pooled organization-wise and promotion-wise, the group could outdo competition.—*Max Schultz, Aluminum Co. of America.*

When the cosmetic industry can do three billion a year, and cigarettes . . . give you a six billion dollar industry, and the people can spend ten billion on liquor, not to mention the travel and recreation industry which is probably at twenty billion a year, I believe the people have money to buy automatics [washers] if we properly present them.—*Mort Farr, Mort Farr, Inc.*

We've tried to keep our prices competitive, but haven't resorted to price promotion. The industry already has suffered enough by attempting to cut prices in an effort to stimulate sales, and it obviously hasn't worked in the absence of genuine demand.—*R. S. Burke, Roper.*



*Here's how*


### WALL TUBE Insures Customer Satisfaction

Wall Tube's sales engineers have an active part in every phase of production of our well-known *Wire and Tube* products. Whether Freezer Shelves, Condensers or Evaporators, service to our customer begins and ends with an experienced Sales Engineer riding herd on the order *in the customer's behalf*. In the photo above, Fritz Bloy, Manager Refrigeration Products, left, and Frank L. Dempsey, Vice President — Sales, check a production run in our plant in the vital early stages when satisfaction can best be assured. At Wall Tube, customer satisfaction is the most important product we turn out!



**WALL TUBE**  
AND METAL PRODUCTS CO.  
NEWPORT TENNESSEE

Circle No. 365 on Reader Service Card.



**Federal Welding Line** at Whirlpool's Evansville, Indiana, refrigerator plant automatically forms and welds together complete food liner shells at a rate of 200 per hour. Here, F. A. Bodenheimer, Jr., manager of welder sales for McKay's Federal-Warco Division, goes over latest production charts with H. J. Muehlbauer, director of manufacturing engineering for Whirlpool, as Robert Russell, sales representative for Federal-Warco, discusses operations with Gene Rommel, general superintendent of tooling for Whirlpool.

Photo by ARNOLD NEWMAN

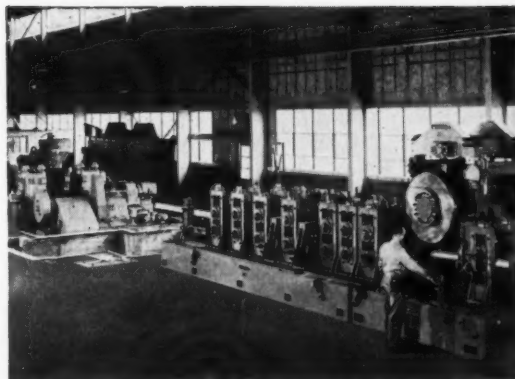


A completely integrated plant . . . a single source of supply . . . one area of responsibility! A new idea? Not really, but an idea that's not easy to bring to reality. McKay Machine has done it for metal fabricators, designing and building equipment to volume produce parts or entire units from raw steel to finished product.

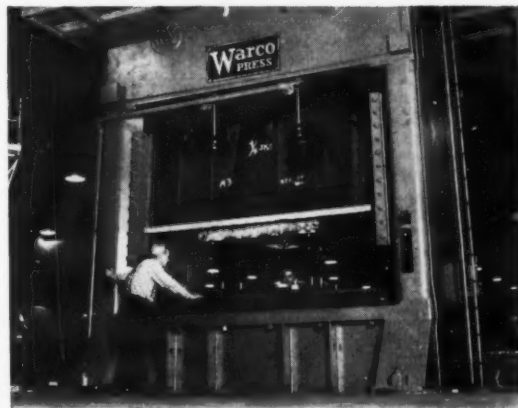
## ***This is McKay Machine***

We know steel handling . . . we've been designing uncoilers and coil-handling equipment for 30 years. McKay Machine knows welding because the highly respected names of Federal Welder and Berkeley-Davis are now a part of our company. We know processing and forming . . . McKay levelers, tube mills, and cold roll forming machines have been specified by leading industrial firms for more than two decades. And McKay Machine knows stamping, as the Warco Press name testifies. McKay builds the industry's most popular shearing and slitting equipment. Only McKay Machine designs and builds all the components for a truly integrated production line. If you are one of the hundreds of manufacturers who must shave production and handling costs to successfully compete, McKay Machine should interest you. If we do, let us know and we'll meet with you at your convenience. The McKay Machine Company, Youngstown 1, Ohio.

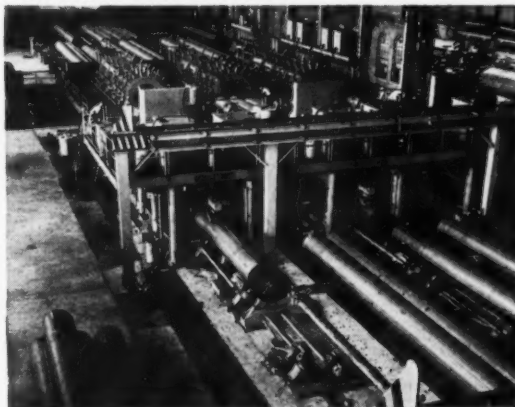
**McKAY**  
**McK**  
**MACHINE**



**McKay Tube Mills** and roll forming machines are considered among the best engineered in the world.



**Warco Presses** can be found in the leading automotive, appliance and aircraft plants . . . wherever stamping is a major operation.



**Berkeley-Davis Fuston Welding Lines**, such as the huge installation above, are used by an ever-increasing number of leading steel fabricators.

# PEMCO NEOWITE. 70

- ◇ high alkali & acid resistance
- ◇ excellent resistance to steam condensate
- ◇ low warp
- ◇ white or mill added colors
- ◇ excellent color stability
- ◇ low temperature (1400°) application
- ◇ competitively priced



Has Pemco  
found the  
**UNIVERSAL  
FRIT**  
?

PHOTOGRAPH OF  
FLAKE FRIT

Universal? Almost, but not quite. But no one else can offer you all these outstanding qualities in one frit at any price. NEOWITE 70 is a truly premium frit, yet it comes to you at a basic, competitive price. Try NEOWITE 70 and see how many outstanding jobs this single, broad range frit can do in your operation. For more information and samples, write Pemco Corporation, Baltimore 24, Md.

RESEARCH AND A FLAME

**PEMCO**

BALTIMORE 24, MARYLAND

HIGH QUALITY PORCELAIN ENAMEL FRITS AND OXIDES

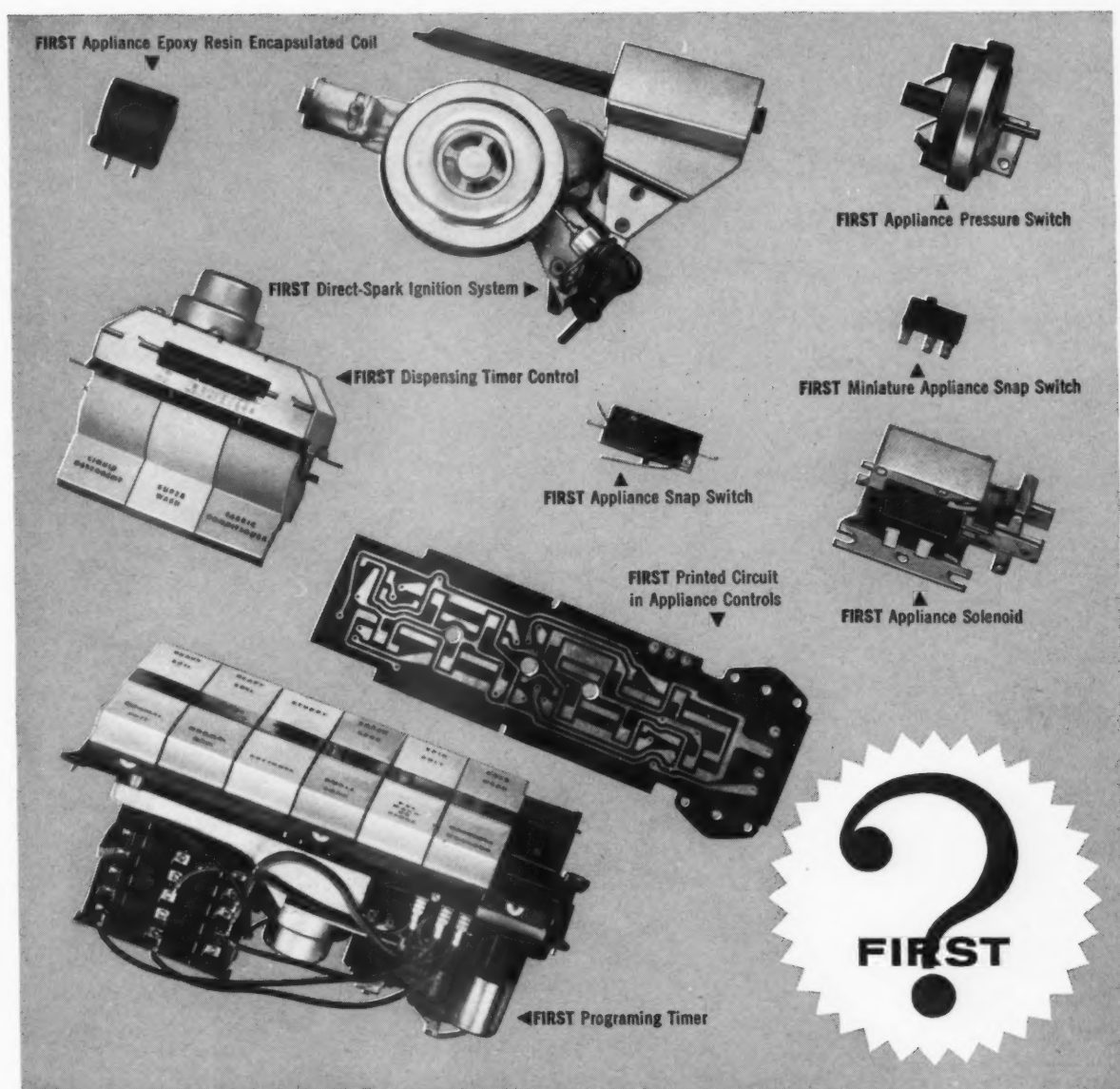
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2

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## FIRSTS - DON'T "JUST HAPPEN"!

Controls Company, with a growing record of control "FIRSTS," is dedicated to: new ideas . . . new approaches in controls . . . improved performance . . . improved reliability . . . improved sales appeal of your products.

Controls Company has the broadest line of appliance controls available . . . maintains rigid quality control

. . . gives prompt, efficient service . . . can design and build the specific control you need to help you get your product into more homes.

Look to Controls Company for the fresh, imaginative approach to appliance controls. Our experienced sales engineers . . . our research and development engineering — all of our facilities are at your disposal.



*Creative Controls for industry*

**CONTROLS COMPANY OF AMERICA**

APPLIANCE AND AUTOMOTIVE DIVISION  
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Heating & Air Conditioning  
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**"I order some extrusions...  
and suddenly  
there's an Olin consultant  
lighting my cigar."**



**"This gentleman walks in with a copy of my extrusion order, lights my cigar and starts talking aluminum, aluminum, aluminum. In short, he's telling me how Olin can save me money by making my dies, giving me better design efficiency in my extrusions. Then he shows me a new welding technique and suggests a brand new market for my product! Who'd think you would ever get service like this from one of America's biggest aluminum producers? Smart people down at Olin. They know how to help a man out where he needs it most." Nobody thinks in aluminum better than Olin. Want to talk to one of our consultants? See the Yellow Pages for our local Sales Office.**

**Olin**  
**ALUMINUM**  
400 PARK AVE., NEW YORK 22, NEW YORK

Circle No. 346 on Reader Service Card.

## editor's mail

### The gas versus electricity hassel

Gentlemen: This letter to you serves as a reminder to offer applause for your sound thoughts on the continuing hassel between gas and electricity in your June issue. You are one of the few people in the industry in a position to offer such precepts, and you did it well.

James N. Krohne  
Public Relations Counsel  
The Krohne Co., Wheaton, Ill.

### Yearly statistical review

Gentlemen: We have noted in your May issue, Volume 18, No. 5, on page 79 a tabulation of metal products statistics.

We find this very interesting and would like to know if you have such a tabulation for the entire year of 1959 and the year of 1960 of total yearly production.

If you have such a tabulation, we would very much appreciate receiving a copy of the issue containing this information.

Harry G. Mitchell  
Wanson Corp.  
Lewistown, Pa.

Yearly production figures are available in reprint form for both 1959 and 1960. MPM annual statistical reviews have appeared for eight years. The 1961 review covers figures from 1954 through 1960.

The Editors

### Quality control

Gentlemen: We were quite interested in the article "Coordinating Quality Control for Twelve Plants" which appeared on page 31 of your July, 1961 issue. On page 51, you mention Rheem's quality control program as described in the December, 1957 issue of MPM.

Do you have a reprint available of this original article describing their q. c. program? We'd certainly like to have a copy. Kindly address this directly to my attention.

B. G. Carleson, Jr.  
Product Engineer  
American Air Filter Co., Inc.  
Defense Products Div.  
Rock Island, Ill.

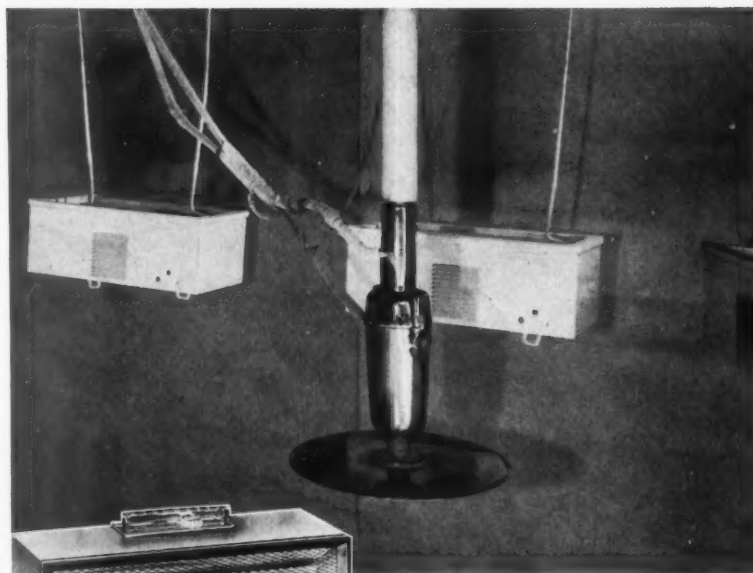
A limited number of reprints of the original 1957 article are available.

The Editors

### Competition is wonderful . . . except

Gentlemen: Your June editorial should receive many plaudits and I congratulate you on the presentation and discussion

TO PAGE 25 →



**SUNBEAM** electric heater cases get uniform finish with **RANSBURG** electrostatic. . . 6 times as many per gallon of paint—15 times faster.

## "Paint Mileage Leaps 500%.... Production Upped 15 Times" Reports ENAMELED STEEL & SIGN CO.

Curt Simmons, President, ENAMELED STEEL & SIGN COMPANY of Chicago, describes results with RANSBURG Automatic No. 2 Process Electro-Spray: "We first painted cases for the new SUNBEAM portable electric heaters with air hand spray at the rate of 200 pieces per day using 6 gallons of paint. Now, with RANSBURG electrostatic we've increased production 1400% to 3000 pieces daily with only 15 gallons of paint." An increase of 500% in paint mileage! *What would savings like this mean in your finishing department?*

### QUALITY IMPROVED WITH RANSBURG ELECTRO-SPRAY

Sags and runs, a problem with the air hand spray, have been eliminated with the automatic electrostatic equipment. Mr. Simmons adds: "Now we achieve a uniformity over the configured area which wasn't always possible before. We know the 50,000th piece will turn out the same as the first."

ENAMELED STEEL—sold on the efficiency and versatility of RANSBURG Electro-Spray—uses 14 automatic No. 2 Process units to meet the heavy demands of their diversified, high volume production.

### NO REASON WHY YOU CAN'T DO IT TOO

Manufacturers—large and small—are reporting similar savings in paint and labor with increased production. If your volume doesn't justify automatic electrostatic equipment, perhaps the RANSBURG electrostatic hand gun will help cut costs in your finishing operation. Write for our new brochure showing actual in-plant production photos, savings figures and detailed information on RANSBURG No. 2 Process Electro-Spray.



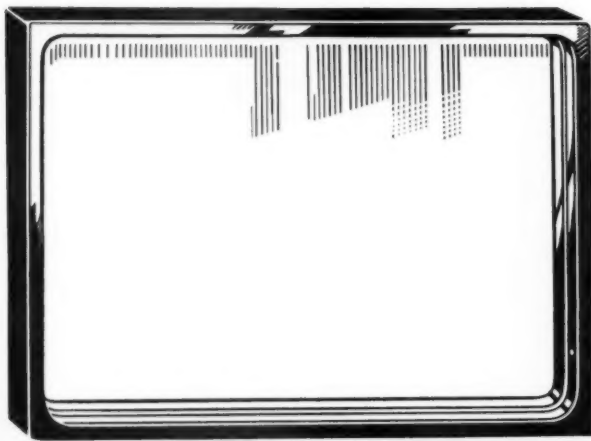
## RANSBURG Electro-Coating Corp.

Box 23122, Indianapolis 23, Indiana

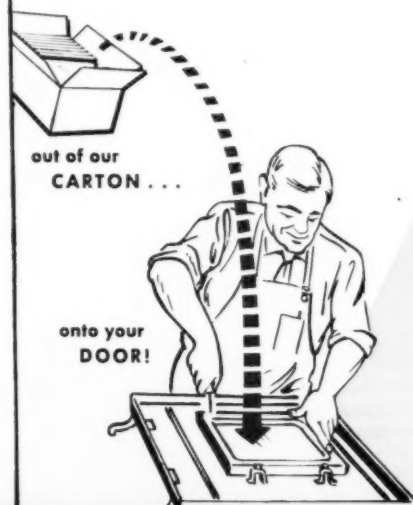
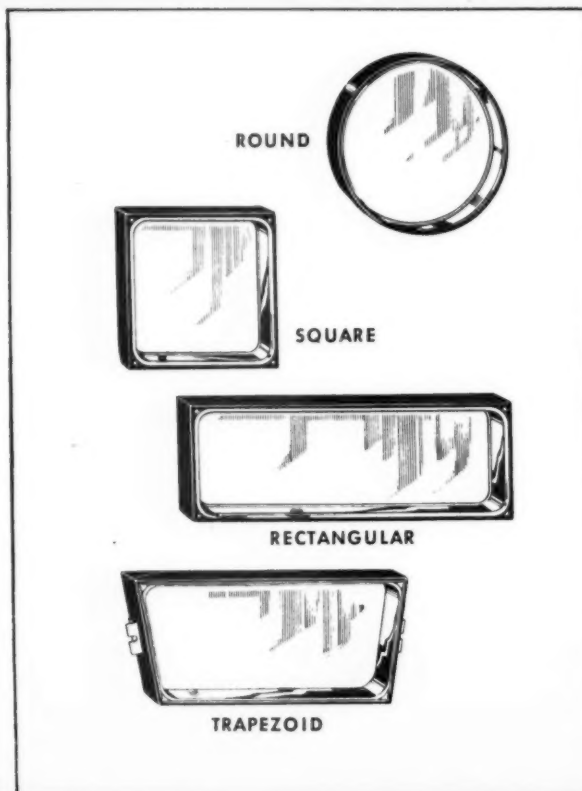
Affiliates in AUSTRALIA • AUSTRIA • BELGIUM • BRAZIL • DENMARK • ENGLAND • FRANCE • FINLAND  
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# has gained World-Wide ACCEPTANCE



Alternate methods of  
attachment may be used

We can manufacture any shape, size, and thickness to meet your engineering requirements





Meterfabriek  
Dordrecht, Netherlands



De Ema N.V.  
Breda, Netherlands



Apparatenfabriek ATAG  
Ulft, Netherlands



Oy Stromberg Ab  
Helsinki, Finland

PERMA-VIEW oven door windows have, for a number of years, been the accepted standard with leading range manufacturers throughout the United States. They have now gained world-wide acceptance. From Canada to Europe—to Australia or South Africa — PERMA-VIEW is recognized as the finest and most economical oven door window.



Husqvarna Vapenfabriks Aktiebolag  
Huskarva, Sweden

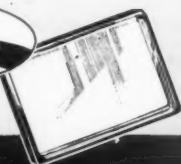


Aktiebolaget Ankarstrums Bruk  
Ankarstrum, Sweden

Mills Products, Inc. takes pleasure in displaying the ranges of six European manufacturers — all of which incorporate the PERMA-VIEW window. PERMA-VIEW — the accepted standard of the world.

Let our specialized production lines serve as a part of your sub-assembly facilities. If you do not use a window, if you make your own window, or if you buy your window from another source, we suggest you phone or write us for complete details on the ease and economy of adding this sales feature to your new ranges.

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# MILLS PRODUCTS INCORPORATED

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in requirements.



# NICKELOID

## ...THE METAL

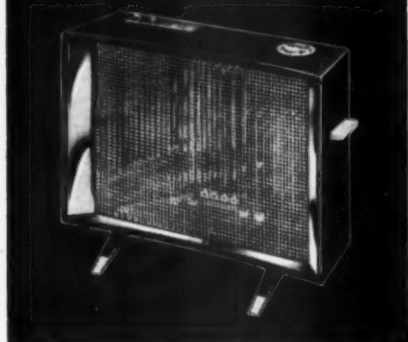
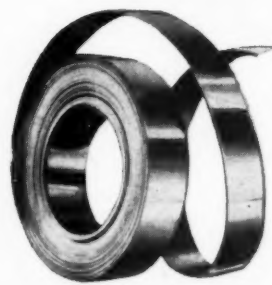
## WITH THE

## BRIGHT

## OUTLOOK



A modern metal, a metal for the times . . . functional, beautiful. At home always with high styling; equally responsive when called upon to serve in rough-and-tumble utilitarian and structural assignments. Nickeloid Metals brighten the profit outlook with plenty of eye-appeal and sales-appeal. You can choose from: glinty hard, mirror-like Chromium — soft, mellow, rich-looking Nickel — glowingly warm Copper — radiant, gold-like polished Brass. Nickeloid Metals add a shimmering luster to thousands of products used in home, in office, in commerce. These sheets and coils are pre-finished, ready for mass production.



HEATER

CANISTER SET

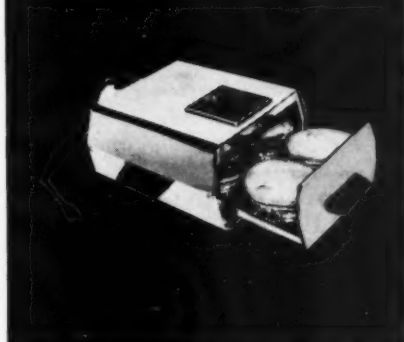
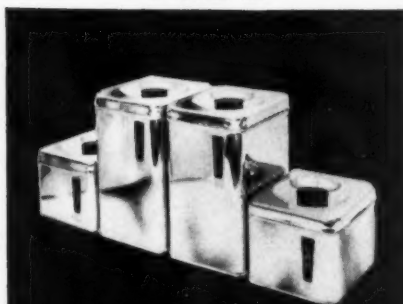
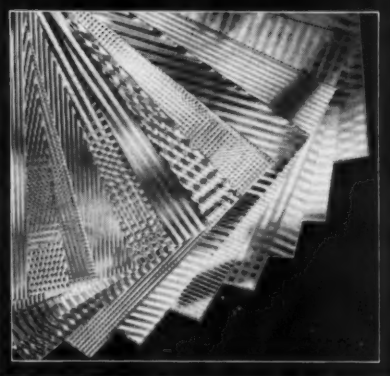


TABLE BROILER

### Designer's Paradise

Here are exciting design materials . . . fascinating and versatile. Nickeloid Metals are eager and willing servants in the hands of the expressive and resourceful stylist. Their potentialities are as unlimited as the boundless imagination of the mind itself. The effects that can be created are immensely varied, so very flexible — giving you wide choices in luster, color, texture, patterns. The styling can be lavish or restrained; cool or warm; shimmering or satiny; soft or flashing. New vistas await exploration by the inventive, whether the use be decorative, structural, or for styling detail. Always, Nickeloid Metals are ductile, durable, workable, practical.



### Details Sent Free

All who design, style, or manufacture will want to learn more about these versatile metals . . . will want to build a file of product information on the materials comprising the Nickeloid family of pre-finished metals. The data will include specifications and fabrication information. Metal samples for inspection are supplied for your file. Larger working samples for testing or for mockups will be supplied when details of the proposed use are furnished. A sales engineer will be glad to show you exciting new applications, to discuss metallurgical or fabrication problems, to help you develop cost comparisons. A letter will bring complete details.

**NICKELOID METALS**

SINCE 1898



### AMERICAN NICKELOID COMPANY

*America's Pioneer Manufacturer of Pre-Finished Metals — Since 1898*

Peru 11, Illinois — MILLS: Peru, Ill. and Walnutport, Pa.

SALES OFFICES in Chicago, New York, Cleveland, Buffalo, Los Angeles, St. Louis, Chattanooga, Boston, Philadelphia, Dallas, Salt Lake City, Seattle, Toronto. See the yellow pages of your telephone directory.

## Editor's Mail

→ FROM PAGE 21

of an age-old problem — that of "cutting off the nose to spite the face," otherwise known as "killing the goose that laid the golden egg."

Let's remember that intra-industry competition is wonderful except when we begin to lose the interest of the public. For lack of a significant united industry we are losing sales to Boating, Vacationing, Motoring and Fishing. What we need is a rallying point from which to reach Mrs. America (not necessarily AGA's), and around which AHLMA, BKI, GAMA, NEMA, PEI and many other worthwhile groups can sell the *Better Living* that is possible with *Modern* appliances.

Gas or Electricity . . . Porcelain Enamel or Paint . . . Steel or Aluminum . . . can't we constructively get together to sell something in principle? or benefits? or living? or America?

It isn't easy to gain the attention of the consuming public's purchasing power. Intra-industry scrapping does nothing for market building which is so necessary to provide a good market for all.

John R. McCord, Director-Marketing  
Ferro Corp., Cleveland, Ohio

### Provocative and helpful

Gentlemen: Would appreciate your advising the availability and cost of reprints of articles in your standardization series, including the editorial "Standardization Can Increase Reliability."

When a copy of your magazine has been available I have found it both provocative and helpful. However, I do not receive it regularly and would appreciate your sending the necessary forms to receive on a controlled circulation basis.

Herschel N. Hedley  
Reliability Specialist  
Sylvania Electric Products Inc.  
Waltham, Mass.

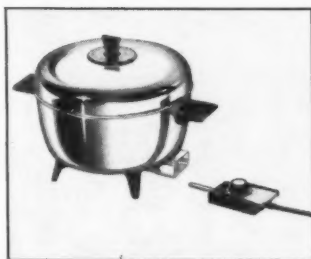
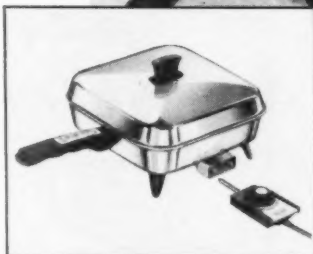
The first nine features in the standardization series will soon be available in reprint form.  
The Editors

### Helpful in product design

Gentlemen: Please change the address for my copy of MPM from 74 Lawley St., Boston 22, Mass. to that of our laboratory at 18 Auburn Rd., Wellesley, Mass.

I have found your magazine very helpful to us in the design of our product line. I know you will keep up your fine coverage of the appliance and fabricated metal products industry.

Roger F. French, President  
Servodyne Corp.  
Wellesley, Mass.



## High quality components vital to merchandising so WEST BEND selects Ampli-TUBE® Thermostat Control Plugs!

"Choosing of high quality components is vital to the merchandising of West Bend's automatic skillet and other "Cook 'n Serve" appliances. An automatic control for these appliances must be of rugged construction and very sensitive to temperature change. The Ampli-TUBE control cord set has proved to be an excellent adjustable thermostat meeting these requirements."

WEST BEND ALUMINUM CO.

Engineered to exact customer specifications from insulator to decal, Ampli-TUBE control plugs combine economy with QUALITY YOU CAN COUNT ON!

**Complete individualized plug assemblies . . .** with undivided responsibility for reliable, safe operation . . . assure long-life calibration, dimensional stability, greater sensitivity, and dependability!

- **Reliable, safe operation . . .** adjustable, probe-type temperature control with positive contact wiping action which assures clean switching, excellent contact life.
- **Long-life dimensional stability . . .** over a 200° to 400°F range due to rugged construction of stainless steel thermal system . . . holds calibration longer.
- **Greater sensitivity, dependability . . .** all-welded construction eliminates lost motion between working parts of thermal system. Even on rapid temperature rise, first cycle overshoot is minimized.

For complete details on Ampli-TUBE Thermostat Control Plugs or KLIXON® Disc-Type Thermostats, contact your field engineer for prompt, personal attention . . . or request catalog!



**METALS & CONTROLS INC.**

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A CORPORATE DIVISION OF  
**TEXAS INSTRUMENTS**  
INCORPORATED

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if you  
make  
**ARCHITECTURAL PORCELAIN ENAMEL PANELS**  
or need a  
clear A. R. frit  
for other  
**COLOR  
WORK**



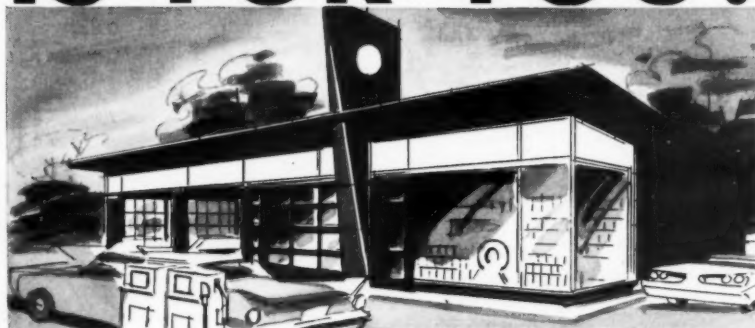
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**1505**  
**IS FOR YOU!**

Made for a Purpose...

Proved in Production

THE ONE CLEAR FRIT THAT  
PASSES THE CUPRIC SULPHATE TEST



Get all the facts about 1505 from your Chicago Vitreous representative. You'll want to order enough for a trial run so that you can learn all of its advantages under your own production conditions.

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# She's Free to Leave at Any Time...



The busy housewife with many demands on her time now has a dependable servant.

She delegates responsibility for the main dish to her automatic Roast Control—just by setting the pointer. Then she is free to go and return when it is convenient. She knows that regardless of how long her dinner is delayed, the roast will be served exactly right—hot, juicy, tasty—no over-cooking—full automatic.

Complete freedom with peace of mind—a happy combination! Why not provide it for your range customers?

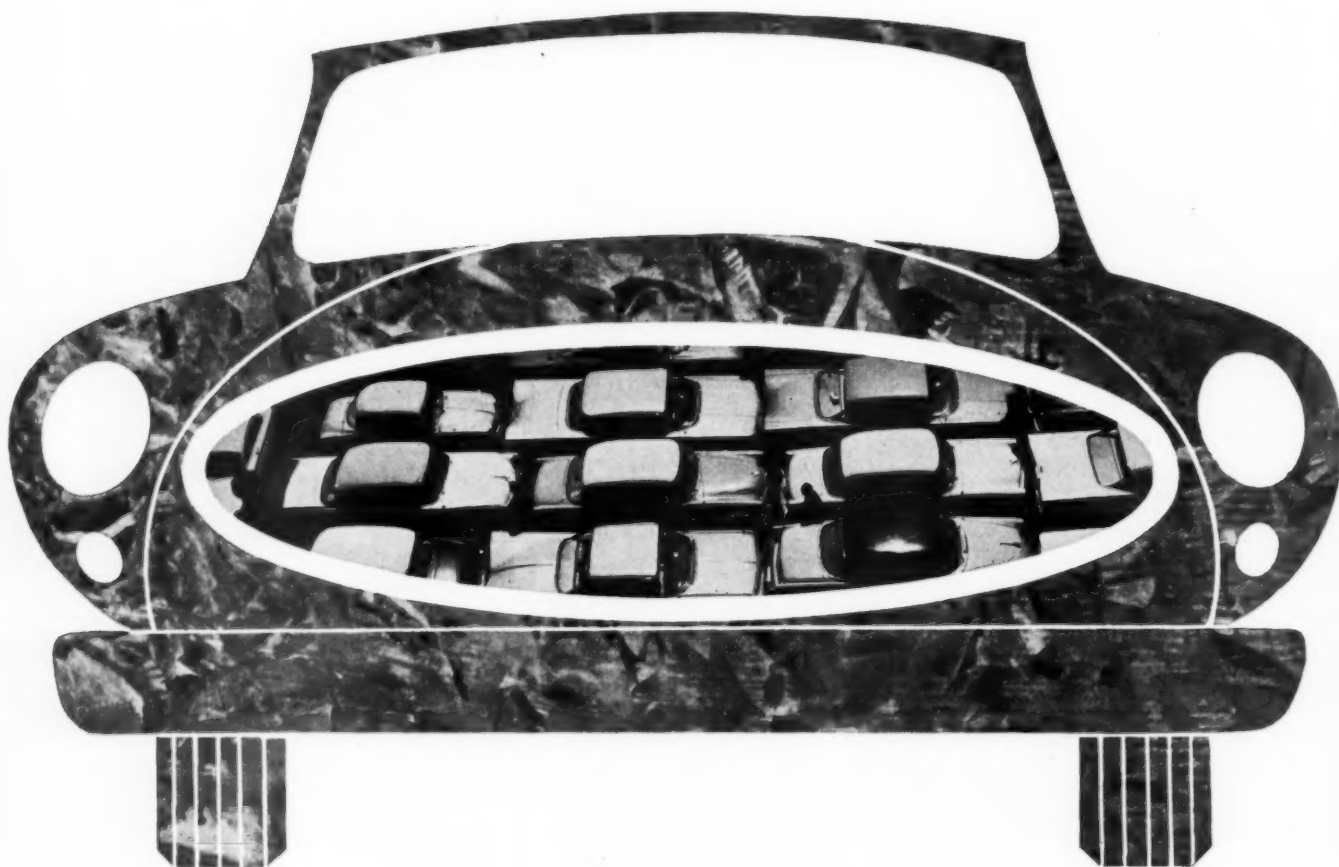


Write for Bulletin 3141 **KING-SEELEY DIVISION**

KING-SEELEY **KST** THERMOS CO.  
ANN ARBOR, MICHIGAN

Circle No. 328 on Reader Service Card.

*More parts in more new cars fend off corrosion . . .*



## GUARDED BY GALVANIZED STEEL

In 1960 the Motor City consumed a massive 218,964 net tons of galvanized steel sheets to fight car corrosion. That's 38% more than was used in 1959 and over 700% more than in 1954.

In the average compact car, for instance, Detroit now uses over 100 pounds of corrosion-resistant galvanized steel sheets. The results are numerous and notable: Car owners are getting greater durability and a sharp drop in maintenance costs and headaches. Manufacturers are getting the cost reductions inherent in galvanized steel's simplified fabricating procedures. Head and tail lamp housings, for instance, formerly required five or six steps when zinc plated or painted after stamping. Now they are moved direct from press to assembly line with their tight zinc coatings completely undamaged by

fabrication. The same economies apply to side members, rocker panels, front and rear rails and cross members.

**WEIRKOTE,® IN PARTICULAR!** Widely used Weirkote is a natural for automotive applications, and the auto industry has been quick to put it to extensive use. To the inherent strength, economy and versatility of steel, Weirkote adds enduring zinc protection that can be worked to the very limits of the steel base without chipping or peeling. This superior product is the end result of years of experience and technical research devoted to coating steel sheets with zinc. Weirkote is manufactured by two National Steel divisions, Weirton Steel and Midwest Steel. Write Weirton Steel Company, Weirton, West Virginia, for further details.



**MIDWEST STEEL**  
Portage, Indiana

**WEIRTON STEEL**  
Weirton, West Virginia



*Divisions of*  
**NATIONAL STEEL CORPORATION**

Circle No. 366 on Reader Service Card.

## Westinghouse stresses quality in plant meetings

employees shown the "fruits of their labors" in press shop session

**F**ACTORY EMPLOYEES ARE EAGER to learn how they can build top quality. This was the report of Westinghouse major appliance executives after they took a new electric range into the press department of the firm's Mansfield, Ohio plant to demonstrate each employee's importance in the production of a quality product.

Called the Continental, the new range has a chrome oven liner and chrome and stainless steel trim along with an anodized aluminum control panel. Since specks of dirt on raw metal components going into presses can result in dents and bumps in the finished pieces, operations in the press department are extremely critical.

### A dramatic way

When production of the product was just getting underway, Westinghouse's Egon Loeckel, quality control manager, and R. P. Brook, range sales manager, looked for a dramatic way to tell press shop employees how important their work was. Formal auditorium meetings were the usual fare in such cases, but for this product, the executives wanted a closer meeting.

They decided to wheel the range into the department for a 15-minute "quality" session just before quitting time. Clarence Walters, first superintendent, and Owen Thomas, supervisor, were to go over the finished product, individually pointing out the components and showing each employee where the piece he worked on ended up in the finished product.

Next, Brook was to spend five minutes describing how the range was to be sold and why quality appearance and performance were necessities. He was to finish by offering each man a folder on



(Above) — Employees listen as R. P. Brook, range sales manager, explains features of Continental electric range.



Brook watches Egon Loeckel, quality control manager, affix to the Continental a card identifying the departmental source of the hinges.

Earl Poorman, die setter, holds the front panel for Brook's inspection.

the new range so he could take it home to show his family what he did for the product.

### "After hours" session

Because of the interest shown by the employees, the company reports that the planned 15-minute meeting turned into a lengthy "after hours" session, and that each man took no fewer than two folders and most wanted more.

The results of the meeting were so encouraging that a similar meeting was held three days later in the plating department. Other meetings are planned on the importance of quality in the Continental and other models in the range line.

MPM

A die setter points out piece he fabricates.





Blitzed by worse than wild Indians, this refrigerator has been shoved around from the time it came off the assembly line.

But tough ACROPON protected it then—and will defend it from now on.

ACROPON finish by DeSoto brings lasting beauty to any appliance. Cuts freight-handling claims to a minimum because it laughs at rough handling.

Ask our field engineers to show you how ACROPON outperforms ...outlasts...any other finish.

**DeSoto Chemical Coatings, Inc.**

1350 S. Kostner Ave., Chicago 23, Ill.

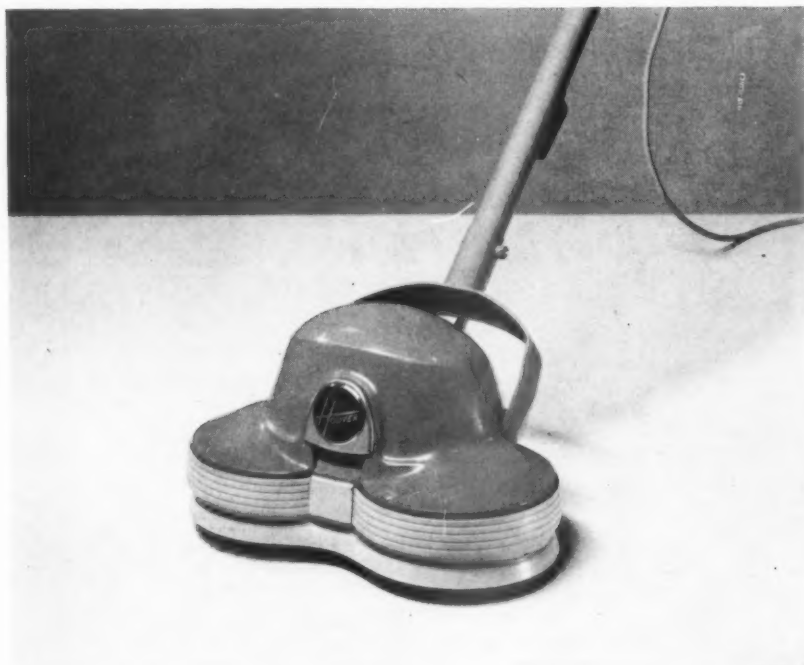
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# The case for double insulation

## in portable appliances

BY *D. C. Krammes* • CHIEF DEVELOPMENT ENGINEER,  
THE HOOVER CO.



The Hoover Floor Polisher-Scrubber.

**D**OUBLE INSULATION for portable appliances offers an efficient method of insuring maximum safety to the consumer. This system of insulation, widely used in European and Scandinavian countries on both portable and fixed appliances, is a superior alternate to single insulation combined with grounding of exposed metal.

Double insulation is mandatory in Sweden, Denmark and Finland, and the preferred insulation technique in Great Britain, Australia, Norway, Germany and Switzerland. These foreign applications of double insulation are not limited to "wet" or "outdoor" appliances, but include portable appliances in general.

The basic theory of double insulation is to provide two insulation barriers between current-carrying parts and exposed metal parts of an appliance.

Recently, a committee composed of representatives from 10 portable appliance manufacturers developed a definition of double insulation as part of a proposal to obtain recognition of the insulation method in the National Electric Code. The definition reads, in part:

"These two insulation barriers are designated as primary (functional) and secondary (protecting) insulation, respectively.

"The primary insulation is the insulation between the motor windings and the field and armature cores or between current-carrying parts and adjacent metal parts. In double insulated appliances the adjacent metal parts, field and armature cores, etc., must be arranged so that they cannot be touched by the UL test finger.

"The secondary insulation is the in-

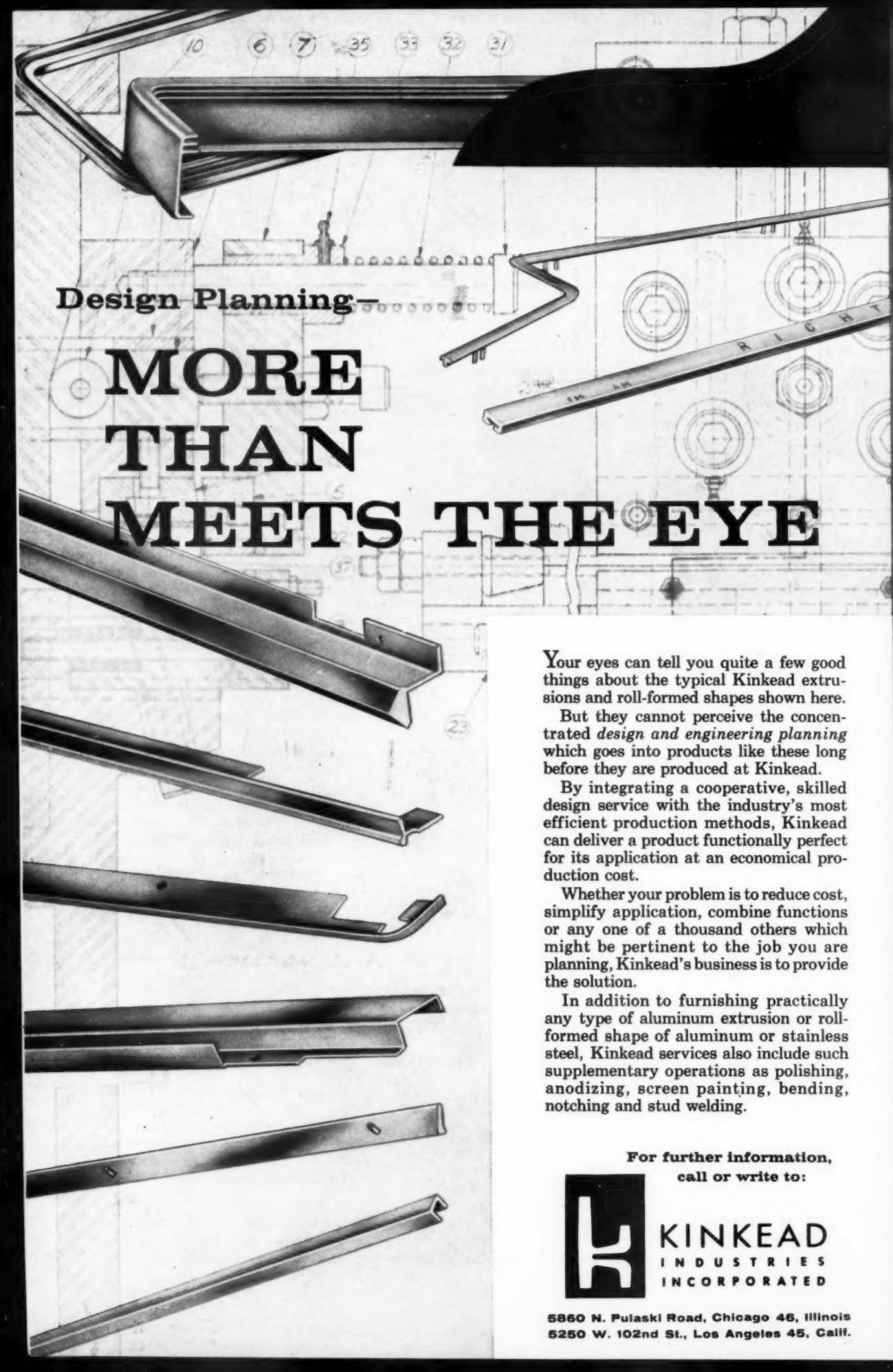
sulation between armature and field cores or metal parts adjacent to current-carrying parts and external metal parts of an appliance. It provides protection from electric shock in the event of failure of primary insulation.

"In situations where complete double insulation is not practicable, reinforced insulation may be used. Reinforced insulation is insulation between current-carrying parts and exposed metal parts of an appliance. It has mechanical and electrical qualities that can be regarded as equivalent to double insulation."

In addition, the recommended definition specifies that the primary and secondary insulation must be able to withstand a potential of 900 volts, 60 cycles, for one minute without failure. Also, reinforced insulation must be able to withstand a potential of 1800 volts, 60 cycles for one minute.

How does double insulation compare in safety with single insulation combined with grounding? The former method has distinct advantages. The practice of grounding fixed appliances does have its virtues, but there are clear disadvantages to applying this technique to portable appliances:

- Grounding-type receptacles in today's homes are rare. Assuming that appliances were supplied with adequate grounding means, few homes are capable of using the system.
- The questionable reliability of the grounding circuit must be considered. Poor contact of the grounding wire with the terminal on the plug, a broken wire in the grounding circuit, or accidental contact of the grounding circuit with the energized wires can lead to a dangerous situation. These types of faults are not recognized since the fault does not render the appliance inoperative.
- Incorrect wiring repairs are more likely with a three-way cord — it can be connected to a plug in six different ways. A few of these combinations are serious



Design Planning—

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(Below, right)—Cutaway drawing of polisher-scrubber. Hoover's new polisher-scrubber has conventional armature and field insulation. The secondary (protecting) insulation is comprised of the motor casing and the insulated spur gear which completely isolates the functionally insulated metal from the exposed metal of the appliance. The hood over the appliance provides the necessary protection against water entry, against contamination of the protecting barrier of insulation, and against exposure of the functionally insulated metal parts.

hazards. Also, if the ground wire were to come loose at the plug and contact the hot wire or terminal, the appliance housing would be energized.

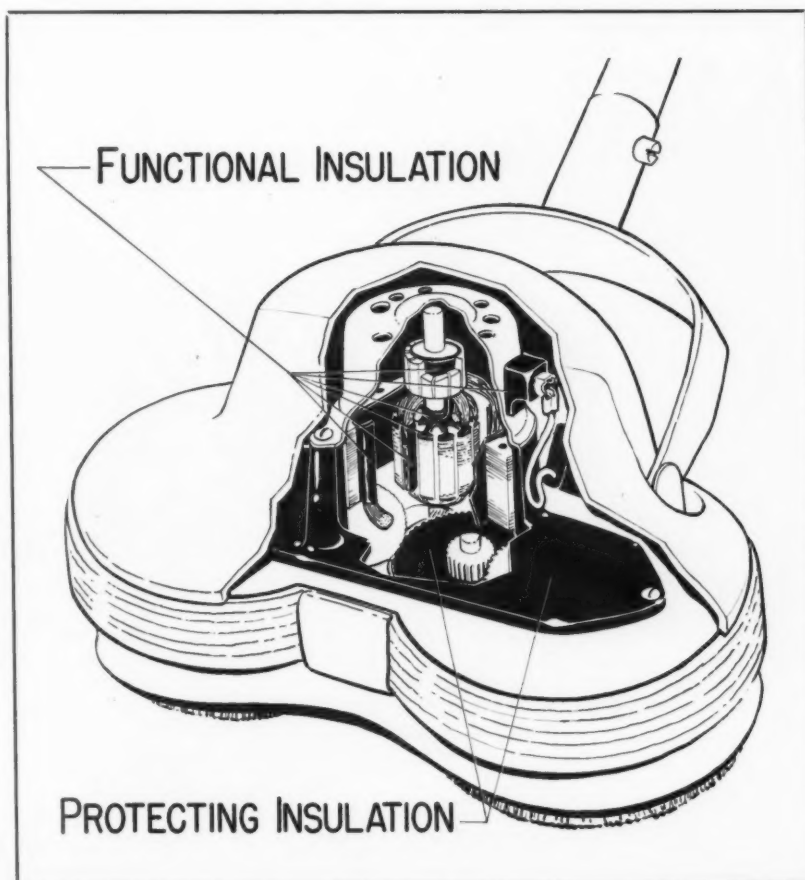
- Extensive grounding of portable appliances in homes would be likely to result in a number of severe shock cases. Shocks received by touching current-carrying objects such as empty lamp sockets and exposed lamp filament leads are not fatal unless another part of the body is grounded. The presence of grounded portable appliances increases the likelihood of fatal shocks.

Foreign products with double insulation have proven the reliability of this insulation system. A highly successful application of the principle in the United States has been on electric razors. Recently, a double insulated hand drill was introduced to the market, and our firm has introduced a floor polisher-scrubber utilizing double insulation.

If applied intelligently, double insulation can provide safety which does not depend upon the questionable reliability of a grounded circuit. Each barrier of insulation alone is sufficient to withstand the normal working voltage of the appliance without breakdown. If one of the barriers should fail, safety is assured by the second barrier.

Double insulation can be reasonably accommodated in many portable appliances which the National Electric Code does not require to be grounded. The safety advantages of this type of insulating system provide optimum security for the consumer, and the technique should be fully exploited in many more portable appliances.

**EDITOR'S NOTE:** Mr. Krammes presented a detailed paper on double insulation at the 1961 AIEE Appliance Technical Conference in Louisville, Ky. He prepared this article for MPM to outline the theory and basic applications of double insulation.



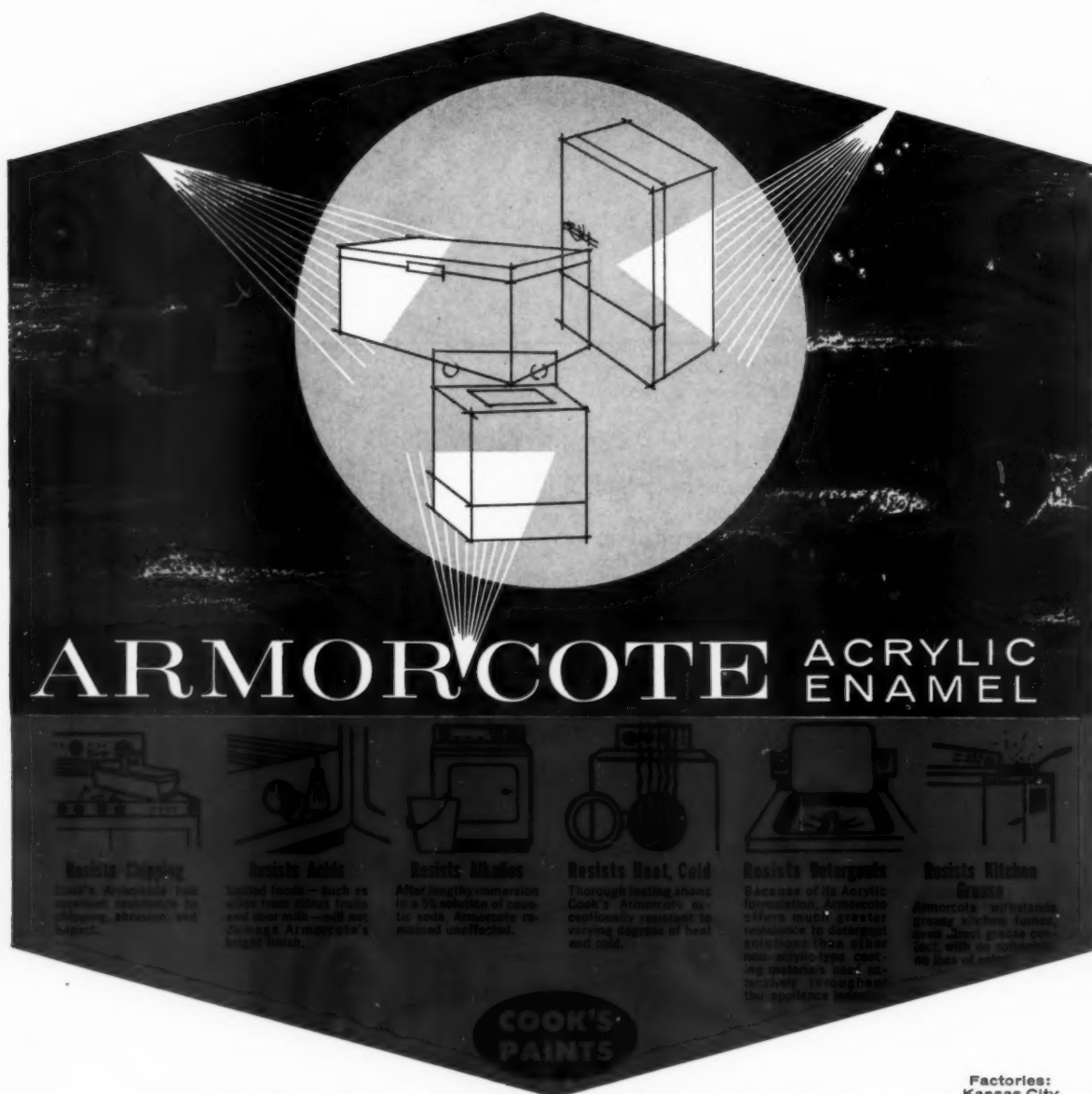


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**Resists Heat, Cold**  
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**Resists Detergents**  
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**Resists Kitchen Grease**  
Armorcote withstands greasy kitchen fumes, and food grease contact with no subsequent loss of gloss.

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## Wanted: A designer of a line of atoms

BY *A. M. Anderson* • EXECUTIVE VICE PRESIDENT,  
CRIBBEN & SEXTON CO.

I BELIEVE THERE IS A TREMENDOUS business opportunity waiting if only I can find a design engineer skillful and creative enough to see the opportunity with me and to perceive a way of structuring the product line.

To describe this concept clearly, it is necessary to revert to the structural hypothesis of the atom which was prevalent in the thirties. Do you remember it? Of course you do: each atom is made up of three elemental particles — protons and neutrons in a densely packed nucleus and loosely bound electrons outside the nucleus.

Now here is the plan for the product line of the new business. We need the designs for the elemental modules. When these modules are properly assembled we can build any of the currently known elements. We will need only four sections in the factory, one for each of the three modules and a final assembly area.

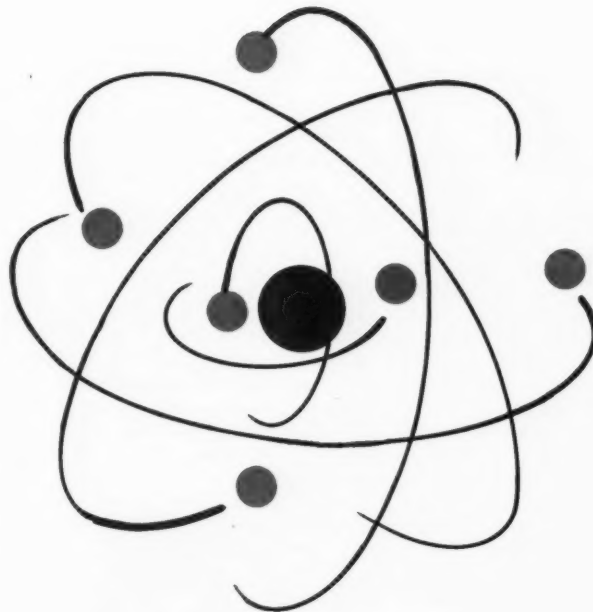
Imagine the economies which would be enjoyed in such a manufacturing system. Simply install the equipment, turn it on, and let it produce elemental modules by the billions. Scheduling would be a bit of a problem in final assembly, but if the model requirements suddenly changed, it would be a simple matter to alter slightly the proportions of the modules used and satisfy the new customer requirements.

If you think this is simple, — just consider the product service system: three parts must be stocked which will fix anything in this world. There is another advantage, too. The marketing group will be able to sell anything the market wants and can never point out that the product isn't right.

And just in case the design engineers think their work is done when the product line is put to bed, let me remind them that the design of the elemental modules isn't just right because too many of the transuranic elements are unstable. Maybe a slight change in one of the modules would stabilize these and open up some new vistas we haven't even thought of yet.

Perhaps this sounds a little ambitious as a design program, and upon sober reflection I suspect it is, but the principle is certainly valid, and it describes rather effectively the creative effort required of the design engineer. He must, with the help of marketing, perceive the array of customer requirements which the business intends to serve and translate these into systems of physical pieces which, when properly connected, will satisfy the customers' needs.

The cleverness of the design can be judged by the ratio of the variety of customer requirements satisfied to the number of modules or elementary assemblies required in the product line. In other words, if many different customer requirements are met with a small number of building blocks, the design would be rated as good, because the requirements of ease of manufacture, service, and customer satisfaction



would be better satisfied than if a larger array of building blocks were needed for the same market effectiveness.

This process of devising a product line — the very essence of the creative work skillful designers have executed for so long — has bred the derivative concept of *standardization*, and somehow this has tarnished the self image of some engineers who feel their individuality and freedom of concept are being stifled. This is indeed an unfortunate circumstance because such reactions simply help to hide the much more important opportunity which the designer really should face — that of creating an even better product line, using as liberally as possible, *standardized* (easy and inexpensive to produce) pieces, parts, and assemblies to satisfy the broadest array of customer requirements which the business intends to meet.

And just in case you ever start worrying about being stifled, think of the simplicity of the elementary concept of the atomic structure and see if you can do as well with your product line!

MORE "STANDARDIZATION" ON NEXT PAGE →

**MPM STANDARDIZATION SERIES POLICY:** It will not be our plan to use information which would tend to stifle improvement of products or logical model changes which offer the end product purchaser added use value.



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G.S. Internals like those illustrated above, for example, are cut to exacting specifications for such applications as air operated hoists, floor machines, radio equipment, navigating instruments and many other uses. If you use Internals—or any other type of Small Gearing—get G.S. in your picture!



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## STANDARDIZATION SERIES

### Standardization may reduce prices

THE FOLLOWING IS A BRIEF QUOTATION taken from a recent "Autolite" advertisement appearing in a national magazine:

"A lot of people (whom we'd like to have as customers) look twice when they see the prices on our new liquid-filled dial indicating thermometers. We don't blame them. They're used to paying 200 percent more. Our prices are shockingly low. How do we do it? Simple!

"We have designed a clever universal mount. One mount satisfies many installation problems (reduces production and stocking costs and allows lower prices to you). We save on the unique but rugged outer casings, too. (So you save even more) . . ."

Here's another way of saying that standardization can pay generous dividends.

Autolite stresses the point that, while this type of "corner cutting" is used for the benefit of customers, the "works" of their dial indicating thermometers and other instruments are accurately made for quality and long life.

### Home builders use standardization principle

FROM A RECENT ISSUE of an Armco Steel Corp. publication, "Residential Builder," we quote the following statement by W. L. Leatherbury, president, Heritage Builders, Inc., Cincinnati, Ohio:

"Many factors have helped push Heritage Hill sales upward, but quality at the right price is the leading influence. We have been able to offer homes with more space, made from better materials, at a price lower than comparable homes in the area.

"We limit ourselves to two basic models—a three-bedroom and a four-bedroom. *Because our plans are standardized, we build and buy in volume. Our unit costs are lowered without sacrificing quality.*

"STANDARDIZATION creates specialists in every construction phase and enables each craftsman to do his work faster and more accurately. Even though our basic plans are standardized, we can reverse or rearrange any home to avoid monotony without increasing costs.

"We inspect each home 40 times during initial construction phases to guard against defects—large or small. We find, too, that by inspecting the work of others we are more critical and quality improves accordingly. Under our inspection plan, each man, including subcontractors, must produce quality work before he is paid. The quality we get makes a salesman out of each home buyer . . ."

NOTE: Boldface and italics added.

## Fabricating at assembly line reduces parts handling

AN MPM STAFF FEATURE

GROUND WAS BROKEN for the new consumer products plant of Duo-Therm Corporation at Lagrange, Ind., July 29, 1960 with first employees being hired October 31, 1960 and the start of production geared for January 1, 1961.

An interesting sidelight in connection with the start of operations at Lagrange was the movement of all production equipment from the plant at which Duo-Therm products had been formerly produced at Lansing, Mich. Production was continued at the Lansing plant right up until the 1st of January. Some items of equipment were moved to Lagrange ahead of time so that work was actually started at the new plant the 2nd of January. Although only 35 units were actually produced the first month, it should be explained that the 35 units consisted of a riding rotary mower comprising over 400 individual parts.

In February, the total production of the plant was 693 units; in March, 2018; in April, 3378; in May, 4494; in June, 5065; to a current production of 5100 to 6000, depending on model scheduled.

The new plant has a complete complement of fabricating equipment, including 86 presses (ranging from 1000-ton hydraulic to 10-ton units). Welding equipment includes seam welders, spot welders and provision for a small amount of arc welding.

Key to the Motor Wheel production story is a concentration of fabricating equipment and sub assembly lines around a single assembly line of minimum length. As explained by Harry Beckley, plant manager, there were two assembly lines at the former Lansing plant: a space heater line, 210 ft. long, and a mobile home heater line, 190 ft. long.

These two major lines are now combined into one with an overall length of 160 ft. This was accomplished by moving all of the press brakes closer to the line so that material coming from the presses feeds direct to sub assembly lines and the final assembly line.

All major sheet metal components are fabricated in the plant. Small parts, wiring harnesses, controls and many other components are purchased outside.

A five-ton-capacity overhead crane serves the steel receiving door to unload sheet and coil from transport trucks. From this area, the steel is delivered to the shear room to be cut to size and then to the adjoining stamping department. The plant is also served by a railroad siding which provides in-door space for two standard 50-ft. cars and a truck receiving dock with sheltered space for three truck trailers. The service depart-

### MOTOR WHEEL — 1903-1961

Today, Motor Wheel Corporation sells over 2800 separate products to manufacturers and consumers. It buys products from over 750 suppliers, purchasing as many as 18,000 different parts during a single year. The company operates five separate plants at Lansing, Mich.; Chicago, Ill.; Newark, Del.; and its newest operation at Lagrange, Ind. An average of 2700 people are employed in company plants. Total assets are \$35.5 million.

Like many of today's sizeable businesses, Motor Wheel had its start in a small way back at the turn of the century. On December 12, 1903, ten stockholders formed W. K. Prudden & Company to manufacture wooden wheels for the infant automobile industry. The plant was located in Lansing, Mich. and supplied wheels for the first production models of the curved-dash Oldsmobiles. Total investment in the new company was \$30,000.

The name "Motor Wheel" came into use in the spring of 1920 when the corporation was organized to purchase the assets of several individual producers. The name is understandable in view of the fact that 7½ million wheels and over 5 million brake drums are produced annually for the automotive and farm implement industries.

Entry into the appliance industry came in 1928 when the company made an initial move toward diversification. The Duo-Therm Division was formed for the manufacture of oil-fired water heaters. Oil furnaces and oil space heaters were added to the product line in 1929 and 1930.

In 1939, after 20 years of operation, the company announced that it had paid out a total of \$68,760,000 in earnings and that net sales for the 20 years totaled \$292,751,000. Between the years 1945 and 1954 the company expended a total of \$14.3 million on property, plant and equipment. In 1953 a new sales record of \$84.2 million was set.

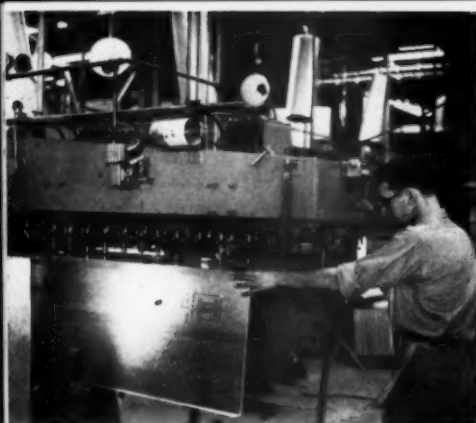
In 1954 the company purchased the Reo Lawn Mower Div., Reo Motors, Inc., a division producing power lawn mowers and snow throwers. These products are currently produced in the Chicago plant.

In July 1960 the company announced plans to build a new plant for manufacturing its line of Duo-Therm heaters, air conditioning equipment, and allied consumer products. The new plant, described in the accompanying article, started production of consumer items in January, 1961.

Manufacturing commenced at Motor Wheel's Lagrange, Ind. plant in January 1961.



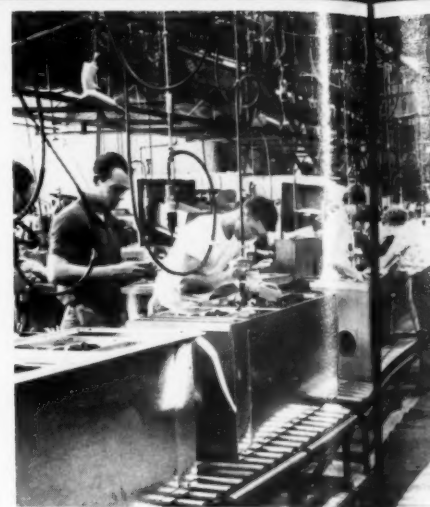




Multiple spot welder at head of assembly line welds right and left-hand sides of furnace outer casing to back. All major sheet metal parts are formed and welded on equipment located within 30 ft of head of the line.



First assembly step is the installation of the heat chamber inside the furnace outer casing. Bolts and speed fasteners are used. When the chamber is installed, the casing is placed on a gravity roller conveyor which serves as the final assembly line (background).



This view of the assembly line shows extensive use of powered hand tools.

ment has a separate dock for trucks.

The stamping department produces parts for 38 different models of heaters, space heaters, mobile home heaters, wall furnaces and air conditioners. All operations such as punching and notching, which can be accomplished in the flat, are provided for in the stamping department. All deep drawing operations are accomplished in this fabricating department. From here the components move to the brakes, welders and bending equipment adjoining the production line for the final fabricating operations.

#### Assembling the Model 558 mobile home furnace

A typical example of the method of operation along the combined "production-assembly" line is the production of the model 558 mobile home furnace.

As explained earlier, all major sheet metal parts are brought to the final assembly line from the press room in the flat. A major component such as the outer casing is formed to shape and then moved to on-the-line welders. At this point near the assembly line there

are eight press brakes, eight pieces of welding equipment, an air press, and a pinch-gun welder, all of which are located within a radius of 30 ft. of the head end of the assembly line. Burners, heat chambers, and other components that are used at the start of assembly are all fed in by overhead conveyors.

After an outer casing is fed on to the head end of the assembly line, the first operation is to install the heat chamber inside this casing, using bolts and speed fasteners. The casing itself is assembled with self-tapping screws. Practically all

### MOTOR WHEEL ASSEMBLY LINE AND RELATED EQUIPMENT

PRESS BRAKES 1-2-4-17

SPOT WELDER 3

TABLE HAND BENDER 5

RIVETER 6

COILER 7

PRESS BRAKE FOR OUTER CASING 8

SINGLE SPOT WELDER 9

MULTIPLE SPOT WELDER FOR FASTENING TWO SIDES OF CASINGS TO BACK 10

HEAT CHAMBER EXPANDER 11

PRESS FOR PRESSING TOP INTO GAS BURNER CHAMBER 12

PRESS BRAKE FOR FAN ASSEMBLY BRACKETS 13

PRESS FOR PUNCHING HOLES IN FAN ASSEMBLY BRACKETS 14

WELDER FOR FAN ASSEMBLY COMPONENTS 15

PRESS BRAKE FOR FAN ASSEMBLY COMPONENTS 16

SPOT WELDER 18

ASSEMBLY LINE FEED BENCHES 19-20

AIR PRESS BRAKE 21

ASSEMBLY LINE WORK BENCHES 22-23

FAN STORAGE RACK 24

WORK BENCH 26

BENCHES 27-29-32-33-42-44-45-49

AIR PRESS FOR FLARING COPPER TUBING 28

TEST BENCH 30

UPENDER 34

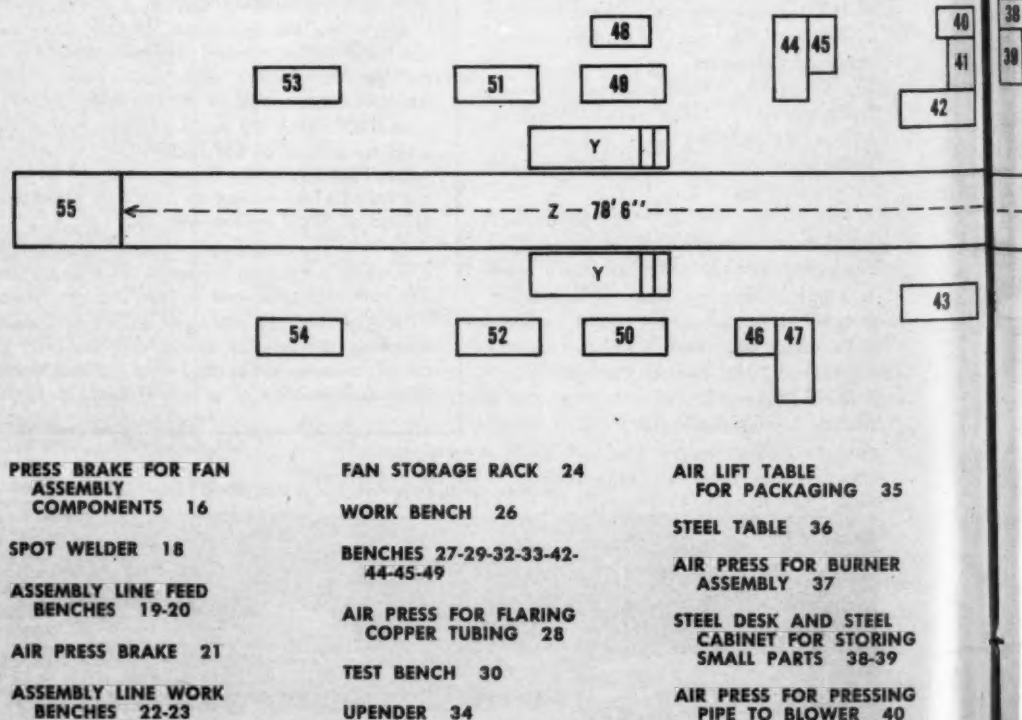
AIR LIFT TABLE FOR PACKAGING 35

STEEL TABLE 36

AIR PRESS FOR BURNER ASSEMBLY 37

STEEL DESK AND STEEL CABINET FOR STORING SMALL PARTS 38-39

AIR PRESS FOR PRESSING PIPE TO BLOWER 40





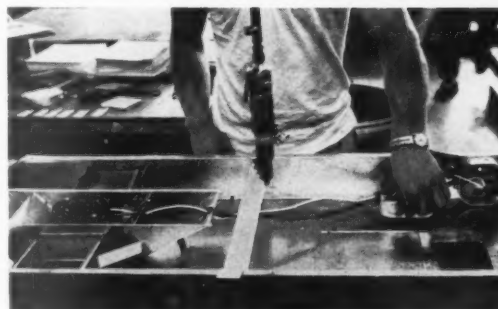


ws ex-  
ols.

(Right) — Following the installation of the control panel, a sub assembly which includes an access door, two switches, a control shield, control bracket and instruction plate, the oil-flow control is fastened in place with a power tool.

MPM PHOTOS

(Right) — Operator completes wiring in two junction boxes after installation of fan sub assembly, which is built up and wired within about 10 feet of the assembly station where it is installed. Strip and angle supports for cabinet rigidity were installed prior to this operation.



(Right) — Final step before mounting of the front panel is an operational check of the fan and all other electrical components.

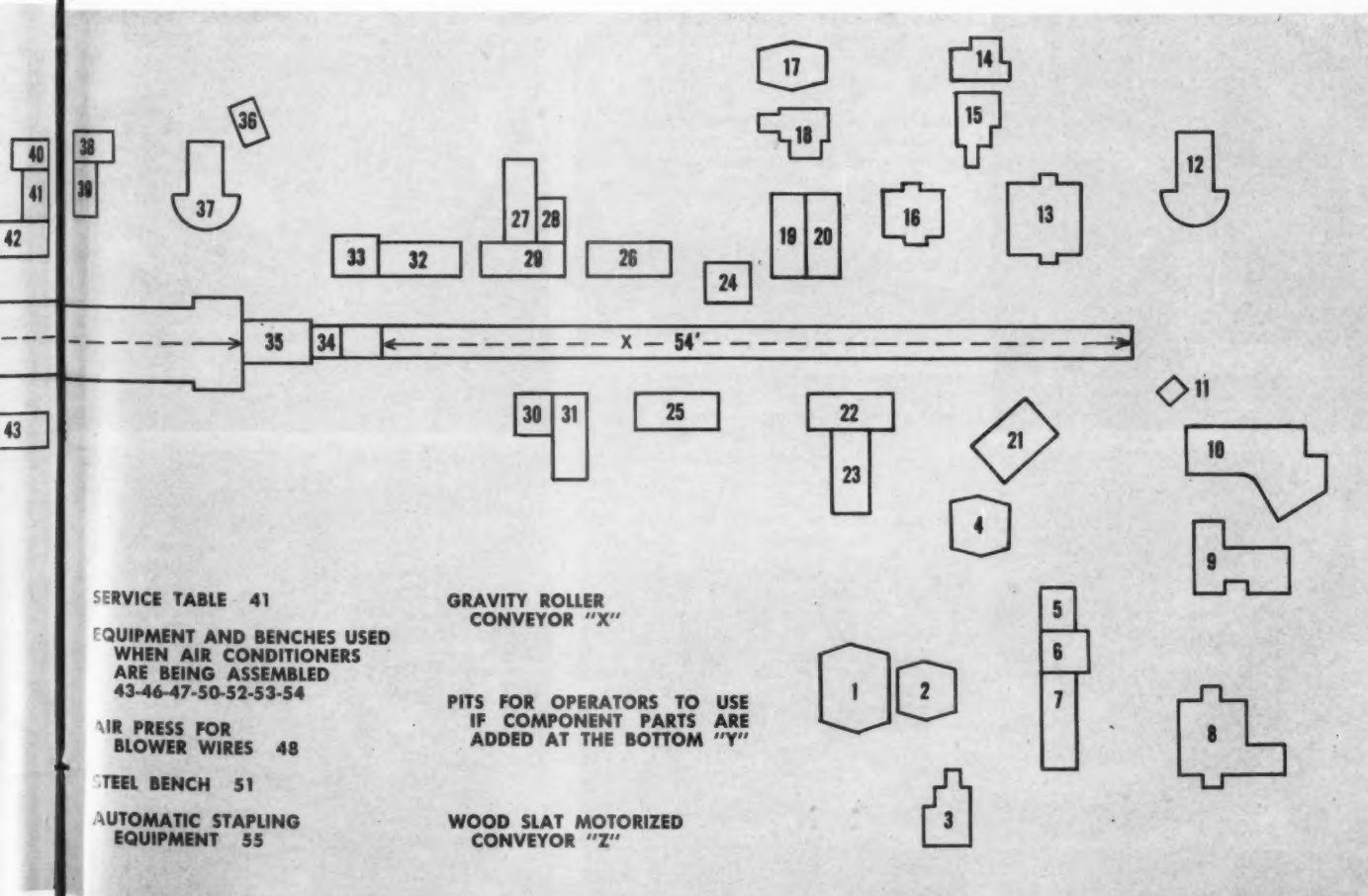
of the hand tools on the line are air operated. With the heat chamber installed, the casing is placed on its back on a gravity roller conveyor which serves as a final assembly line.

The next step in assembly is the addition of a control panel. An access door,

TO PAGE 63 →



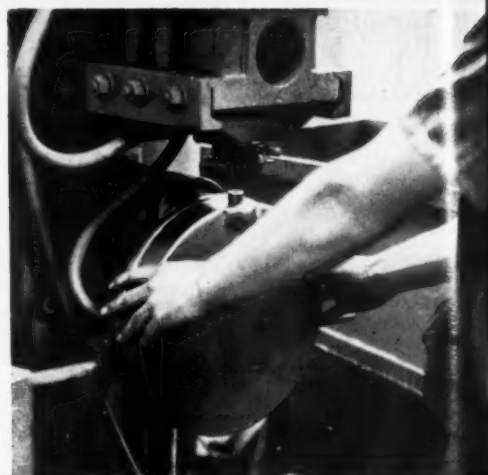
(Above) — The completed furnace is mechanically upended on an elevator section of a roller conveyor which feeds a motorized wood slat conveyor to the packaging line. Employee operates unit that staples top and bottom of carton simultaneously.





## Efficient fabricating line for Model 558 oil burner assembly

(Left photos, from top) — First step in fabrication of oil burner assembly is the forming of two half circles from two flat, punched sections which form the outside shell (this operation not pictured). The two half circles are then joined in the butt welder pictured. One seam is welded, the unit is turned over, and the other seam is welded.



Next, the shell is carried by roller conveyor to a peening press, where the welds are flattened.



Weld is ground (on grinder at right) on bottom edge of shell so bottom section will fit snugly, and a bead is placed around top edge of shell in operation pictured.

Shell is then expanded to its true diameter.

MPM PHOTOS

(Below, center photo) — Drawn bottom sections for the burners are processed in the same department. Here, in the first operation, a hole is pierced to accommodate a feed pipe.



(Right photos, from top) — A pipe stud is then welded in place on the bottom.

Final step in the processing of the burner bottom is a leak test to check the soundness of the weld. Operator is placing the part in test fixture.

Shell and bottom are united by spot welding in machine at right. The tack-welded unit is then seam welded in water-cooled welder at left.

Final operations consist of pressing a partition into the shell (on press at right), pressing in a baffle (not shown) and spot welding the baffle on the unit at left. The completed units are hung on the overhead conveyor, where they are stored or fed directly to the final assembly line.



**HERE'S HOW PLANT MANAGER  
HARRY BECKLEY DESCRIBES THE  
MOTOR WHEEL FABRICATION-  
ASSEMBLY SYSTEM.**

"Our individual production lines were originally from 200 to 300 ft. long with about five lines producing the various consumer products. We then moved to a smaller plant in Lansing with approximately 400,000 sq. ft. where we had three major production lines and two smaller sub assembly lines. The space heater line, for example, was approximately 210 ft. long and the mobile home line was approximately 190 ft. long.

"We have now taken these two lines and combined them into one with an overall length of 160 ft. We accomplished this by moving all of our press brakes closer to the line so that material comes directly from the presses to the sub assemblies, with the formed parts running from only 10 to 20 pieces ahead of the final production lines.

"The major change here is that in our former operation, we had all of our press brakes segregated from the line in a small department of their own. This meant that we had to brake everything well ahead of the line, stack the parts and then move them to the line as needed.

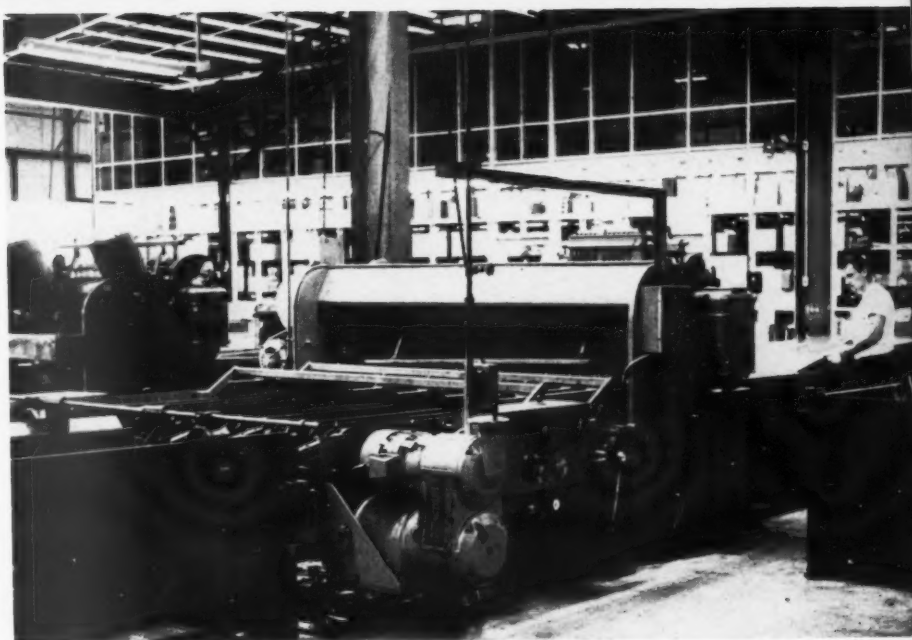
"While there are some definite advantages in having a longer line, we feel that in our operation here we have a much tighter control with the short line. Supervisors can supervise operations much more closely and the foreman on the line is much closer to his work. Instead of covering a 300 to 400 ft. line, he can walk 40 to 50 ft. in either direction and cover major points of importance."

A SIX-PRESS LINE for fabricating top grilles for the mobile home furnace occupies an area measuring only 9 by 16 yds, and includes eight separate operations. Flexibility in press location for running various pieces is attained by mounting the smaller presses on steel skids.

First operation in the sequence is the drawing of a 15½ by 24-in. 20-gage blank to a depth of 2½ in. on a 1000-ton hydraulic press. This die also embosses one end and lances two holes. The part is then transferred to a 525-ton mechanical press by belt conveyor for a trimming operation on all sides of the stamping. A 375-ton press containing two sets of dies is next: the first set pierces the louvers and the second pierces the sides.

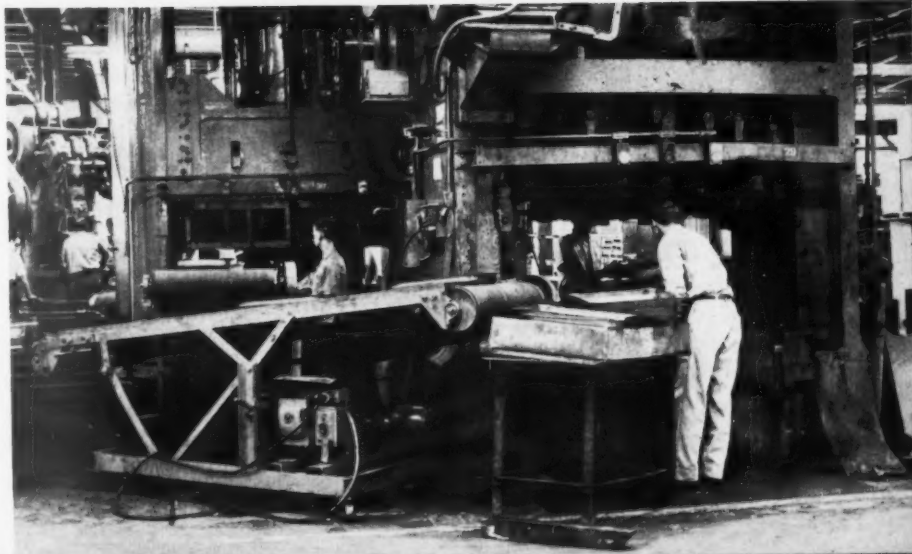
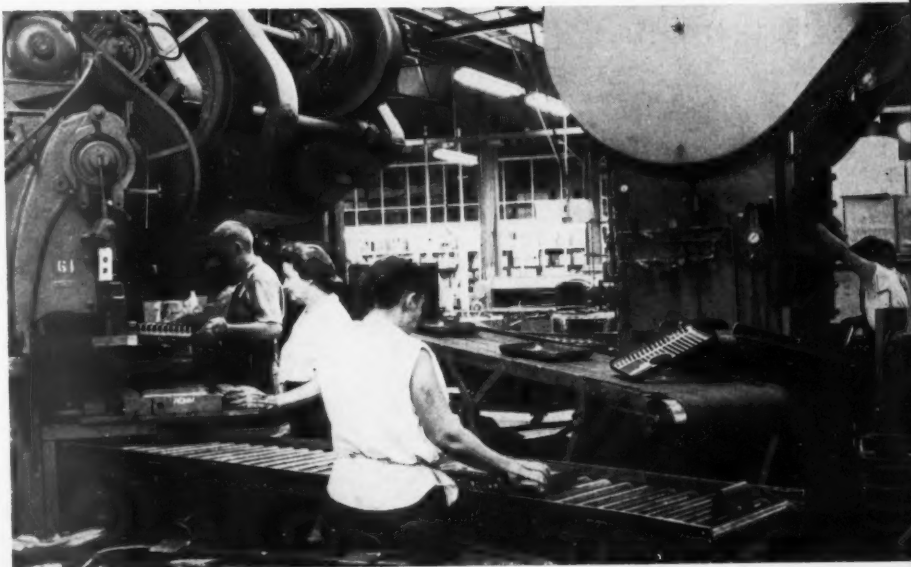
Another belt conveyor carries the grille to the fourth press, which also has two sets of dies. The first set performs a drawing operation on the side, while the second set does a draw neck job on the top and forms the door hole.

In the next press the latch holes and hinge holes are pierced and, in the final press, a 35-ton mechanical model, the front flange is re-struck to insure a tight fit between the grille and the casing.



One of the major pieces of equipment in the shearing department is this sheet shearer equipped with an automatic stacker (left).

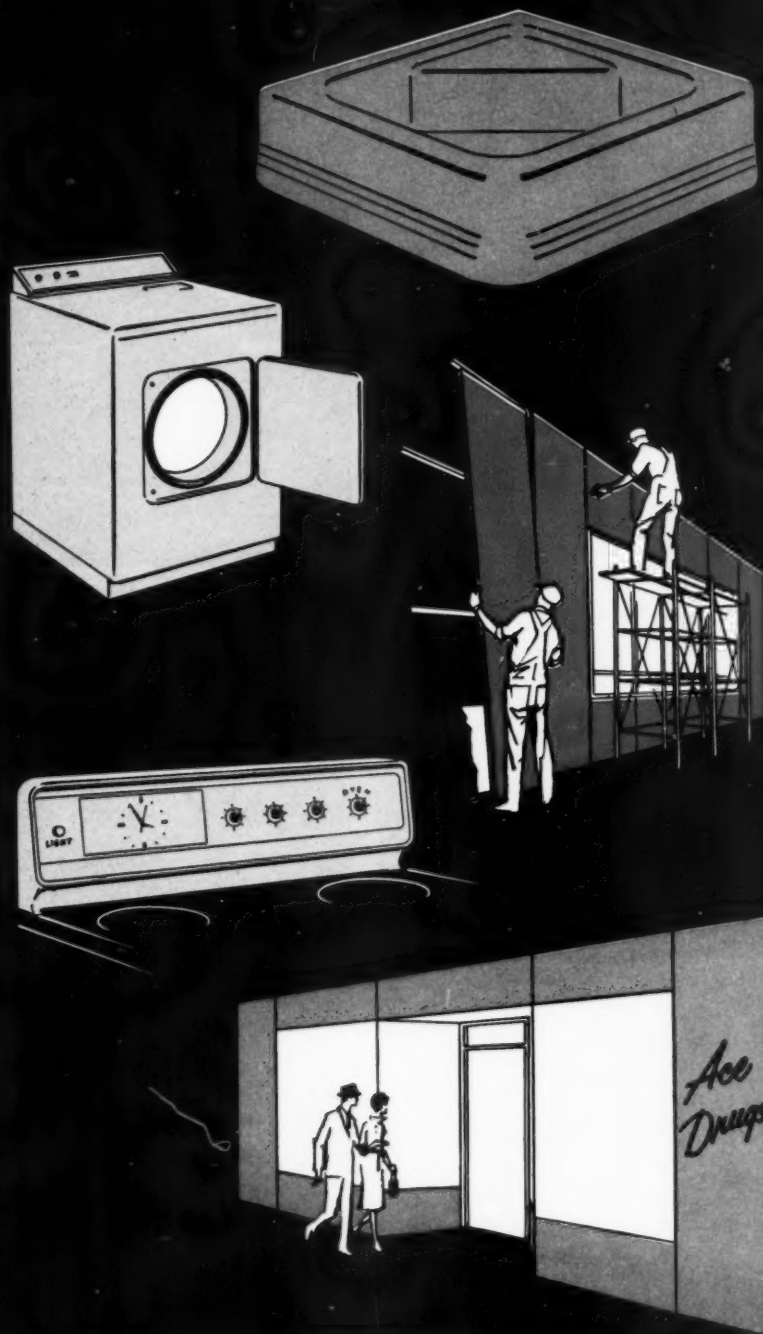
MPM PHOTOS





Production-  
proved  
**COLORS**  
for all frits,  
all applications

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ZIRCONIUM / ANTIMONY  
ALUMINUM / SCREENING PASTES



**FERRO  
CORPORATION**  
*Color Division*

Cleveland 5, Ohio . . . Nashville 11, Tenn.  
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**Color Problems are Negligible** when you use the *right* colorants with the *right* frits. You get *both* from Ferro, *production-proved* under day-to-day operating conditions.

World's largest manufacturer of inorganic colors, as it is of ceramic frit, Ferro has the resources and *know-how*—and competent field service staff—to solve almost any problem. Once solved, you can relax for Ferro's modern production facilities and close quality controls assure complete uniformity in the products you get.

Time is money, and Ferro's complete color service helps you get into production *fast*. You produce better ware, have fewer rejects. Just write or phone us! We'll take it from there.

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## Producing pleated filters

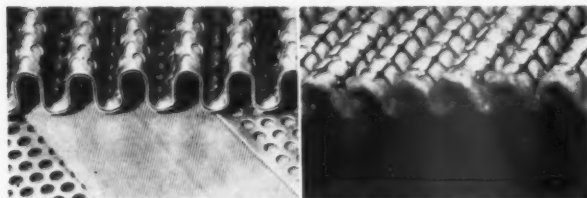
A NEW METHOD OF MANUFACTURING PLEATED FILTER materials which offers uniformity and close tolerances, as well as substantial production economy, has been devised by the Twin Coach Co., Buffalo, N. Y. The method is based on the use of a newly developed machine that folds metal and other materials into corrugated shapes in contrast to the traditional method of forming corrugations by drawing.

Key element in the process is a cam-controlled action which moves the forming dies in both horizontal and vertical planes.

The method permits the pleating of micronic metal cloth with a minimum of impact upon its original characteristics; there is said to be no distortion of micron capability because very little is introduced to the material. Some micronic material that has been pleated has had as many as 500,000 perforations per square inch.

The technique has proved itself effective in pleating a wide variety of filter materials, including steel, copper, brass, aluminum, cloth, felt and paper.

The machine can simultaneously pleat and laminate different materials.



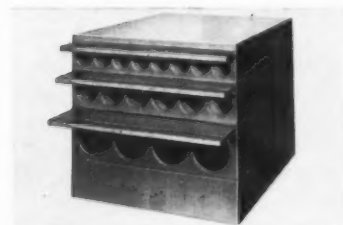
(Left) — Metal cloth and perforated laminating material, before and after pleating and laminating. (Right) — This felt material was simultaneously pleated and laminated with wire mesh for stability.

## Controlled filing system

A MODERN MODULAR APPROACH to filing rolled tracings, prints and other rolled materials has been announced by Hamilton Mfg. Co., Two Rivers, Wis. Called the Moducor, the product is said to provide flexibility in rolled filing equipment with varying tube dimensions to fit every size, type or activity of stored materials.

The Moducor system consists of four, six and eight tube modules in 4 in., 2 $\frac{3}{8}$  in., and 1 $\frac{7}{8}$  in. diameter tubes. All modules are of a standard width to permit stacking any size modules for varying storage and activity requirements. Individual tubes are foil wrapped paper laminate with steel ends for maximum strength, and are moisture, dust and smoke resistant. Tubes are anchored mechanically in a metal frame to prevent accidental tube removal, while permitting easy insertion of a new tube without requiring tools, paste or glue.

Hinged doors are held in open or closed position by spring tension with latches or catches. All modules are reversible so that doors may swing up or down.



Labeling system speeds location and removal of drawings and simplifies control and return. Flexible design meets all filing needs, from single sheets of high-usage prints to maximum density storage of completed or inactive projects.

MPM OCTOBER • 1961

# HOW MUCH EXTRA FOR EXPERIENCE

# \$???

"A wise man profits from experience — the wisest man profits from the experience of others."

United Steel and Wire Company's experience covers 52 years of progressive development in the production of finished wire components for the appliance industry.

YOU can be the wiser man and profit from this progressive experience by placing your confidence in business with UNITED.

How much extra does it cost?

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Refrigerator Rack

Freezer Basket

Broiler Rack



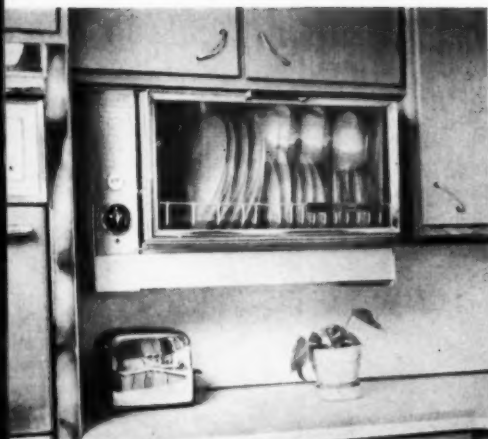
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the Food Industry

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## Compact dishwasher provides installation flexibility



Eye-level installation is possible with new Ling-Temco dishwasher. Here the unit is suspended on special brackets under existing cabinets. It can also be recessed in a wall, mounted on top of a counter, used floating as a room divider, or installed in other ways.



A compact unit, the dishwasher accommodates service for 6, 10 or 15 in three models available. Shown is a below-counter installation.



Dishwasher can be operated as a portable unit as well as a permanent installation. Here it is mounted on a roll-away brass stand. Pre-plumbed, pre-wired and pre-connected, the unit can be converted to a fixed installation.

Ling-Temco unit available in three sizes—installs in open w

### AN MPM DESIGN FEATURE

**F**LEXIBILITY OF INSTALLATION is one of the top design features of an electric dishwasher recently introduced by Temco Industrial, a division of Ling-Temco Electronics, Inc.

The dimensions of the new unit represent a departure from the traditional dishwasher design. Available in three models, accommodating service for 6, 10 or 15, cabinet length of all units is 30 in. The smallest model is 13 in. deep and 15 in. high, the next size is 13 in.

deep and 18 in. high, and the large model is 23 in. deep and 18 in. high.

The 13-in. depth of two of the models matches the depth of most kitchen wall cabinets, which allows the dishwasher to be installed on the counter-top below the cabinet and still leave half or more of the counter-top as work space.

Because of the unit's "horizontal-rectangular" shape, and the fact that it can be either front or top loaded, several other installation schemes are possible: under the counter; on the wall, with cabinets or alone; below sink bowl, surface range or built-in oven; or mounted on poles as a room divider.

### 25-minute cycle

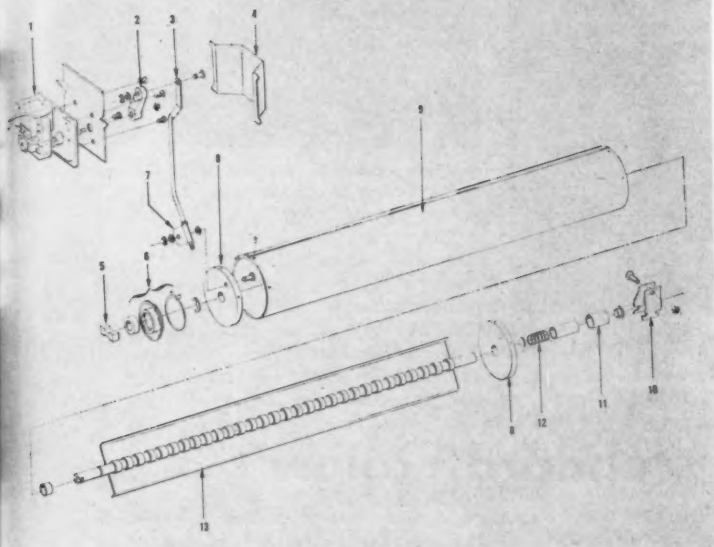
A distinctive feature of the dish-

washer's 25-min. cycle is a 12½-min. "steam" cycle following washing and rinsing. The steam is "fogged" from a self-contained steam generator and condenses on the dishes as distilled water, eliminating water spotting.

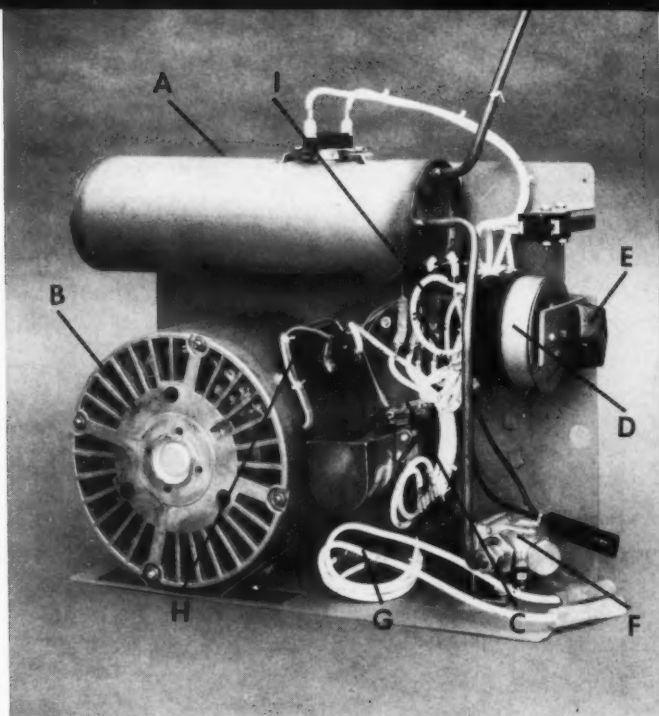
The dishwasher is placed in the wash-rinse cycle by closing the door and turning the control knob fully clockwise to the "wash" position. This cycle continues for 12½ min. and is followed by the steam cycle.

The washer unit assembly, located in the bottom of the washwell compartment, is composed of a two-ft impeller blade which runs the length of the cabinet, a baffle, baffle discs, rod, crank, bearing and arm. The impeller, driven by a 1/3 hp motor, circulates water at

## EXPLODED VIEW OF WASHER ASSEMBLY



- |                |                |
|----------------|----------------|
| 1. GEAR MOTOR  | 7. ARM         |
| 2. CRANK       | 8. BAFFLE DISC |
| 3. ROD         | 9. BAFFLE      |
| 4. SHIELD      | 10. CLAMP      |
| 5. DRIVE BLOCK | 11. SLEEVE     |
| 6. DIAPHRAGM   | 12. SPRING     |
| 13. IMPELLER   |                |



## CHASSIS ASSEMBLY

- |   |                                      |
|---|--------------------------------------|
| A | STEAM GENERATOR CHAMBER              |
| B | 1/3 HP MOTOR                         |
| C | FLOAT VALVE—MERCURY SWITCH PROTECTOR |
| D | TIMER                                |
| E | CONTROL KNOB (RECESSED)              |
| F | VALVE WITH BUILT-IN "FLOW REGULATOR" |
| G | DOOR OPENER CUTOFF SWITCH            |
| H | OVERLOAD MOTOR PROTECTOR             |
| I | THERMOSTAT SWITCH                    |

in open wall, on counter-top, under counter, or above sink

approximately 100 gallons per minute at full load. At the same time the impeller motor starts operating, a gear motor, through mechanical linkage, rotates the washer unit baffle. This baffle is mounted over the impeller, and directs the "sheet" of water from one area to another. The average complete cycle consumes  $7\frac{1}{2}$  gallons of water, which is constantly screen filtered.

Since the Ling-Temco dishwasher provides no separate cycle for washing and rinsing, fresh water is continuously added during the wash-rinse cycle by a solenoid valve. The water also drains continuously through the overflow drain in the bottom of the washwell. Therefore, the sudsy water that is present immediately after starting the cycle will

gradually decrease until only clear water is recirculated over the dishes before the machine starts the steam cycle.

Following the wash-rinse cycle, the impeller motor and the gear motor stop, and the heater on the steam generator goes into operation. A thermostat is used as a safety device to prevent overheating if the steamer is dry. When water begins to boil in the steamer, the steam is directed to the washwell through the same tube that carries the washing-rinsing water.

The steaming chamber is filled with enough water for approximately two steam cycles. Thus, the operator may leave the dishes in the dishwasher and steam them again immediately before using.

## Convenient servicing

Components on the dishwasher are mounted on a pullout frame. For service, the entire chassis slides forward for convenient servicing or complete replacement. The washing unit also slides out the front.

The fold-down door has a heavy, die-cast frame with copper-nickel-chrome plating. The frame supports a translucent glass window, which provides a view of the washing action but hides dishes stored in the washer.

Dish and silverware racks are made of vinyl-coated welded steel wire.

The Ling-Temco dishwasher is available in white, pink, yellow, turquoise, coppertone, woodtone and stainless steel.





Following cleaning, phosphating and the application of the prime coat, the parts are sanded (background) in preparation for final coat.



Robert A. MacNeille, president and chairman of the board, St. Charles Mfg. Co.

## Custom finishing in 22 "standard" colors

AN MPM STAFF FEATURE

**St. Charles Mfg. Co. operates versatile system for painting kitchen cabinets and institutional casework**

**T**HE AUGUST 1961 ISSUE OF MPM carried a feature on a versatile welding machine in use at St. Charles Mfg. Co., St. Charles, Ill. It was felt that the equipment was worthy of feature treatment because its use allowed efficient "custom" fabrication of recessed steel cabinets for schools and hospitals.

Since no kitchen cabinets or casework are produced until specific customer orders have been received, the flexibility concept must carry through the entire

manufacturing operation at St. Charles. To handle this work on a large-scale basis, the company had adapted some mass-production techniques which complement the "built-to-order" philosophy. The St. Charles organic finishing system is a prime example.

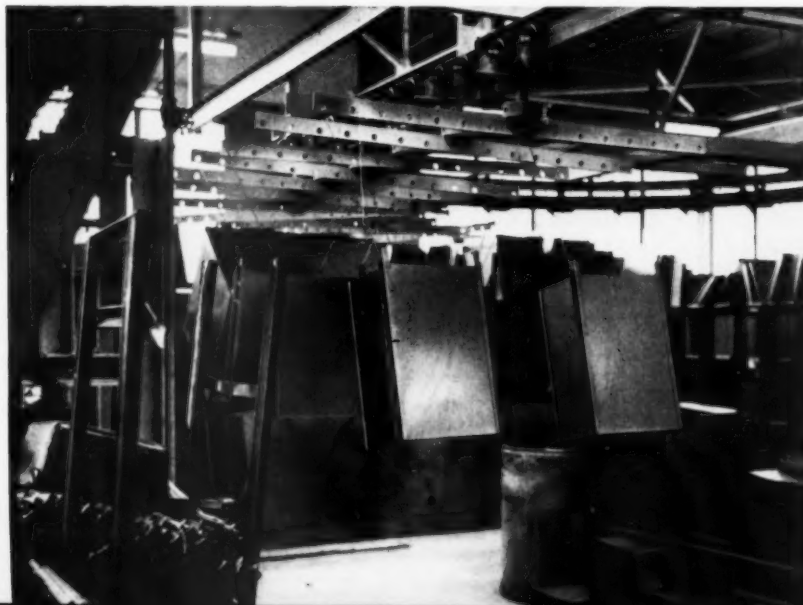
The company offers its products in 22 stock colors, plus any special color the customer requests. Sixteen of these colors are supplied to each of the three finish spray booths by individual circu-

lating systems. The six other standard colors, as well as any special colors, are supplied directly from pressure tanks located in the booths.

From the fabrication area, the cabinets and accessories are hung on racks suspended from overhead conveyors. At this point the various components which make up an individual order are grouped to facilitate finishing, final assembly and shipping.

First step in the finishing operation

Cabinets and accessories are hung on overhead conveyor after fabrication and sent to finishing department. Parts which make up individual orders are grouped to facilitate further processing.



Entrance end of one of three final coat spray booths. Colors and part numbers are marked on the parts after phosphating and dry-off.





#### A QUARTER CENTURY OF CUSTOM MANUFACTURING

St. Charles Mfg. Co., St. Charles, Ill., last year celebrated its 25th year of custom steel kitchen manufacturing. Robert A. MacNeille, president and chairman of the board, sums up the firm's quarter-century experience with the "custom" concept in the following way:

"It would have been much easier to set up to make and sell a mass-produced product. However, for the very reason that it would be easier, there would be more and tougher competition in a mass market. Our business consists not only of a product, but also of a designing service made possible by a very flexible design and a wide range of sizes, types and colors. The details which at times seem burdensome are in essence the heart of our business and explain why St. Charles is different and a true custom builder."

The company was organized in 1935 and began operations in a small plant in St. Charles. Early production was on a contract basis, although within its first year the firm was engaged in producing its own custom steel kitchen units. The war years interrupted kitchen production, but it was resumed quickly at the close of the war.

In 1952 a second plant ("Tyler Road plant") was completed. This facility was designed specifically for the fabrication of custom steel kitchens. An addition to this plant was completed early this year, increasing the total available floor space in the two plants from 135,000 sq ft to 177,000 sq ft.

Although individual casework for schools and hospitals have always been produced by the company, it became necessary to create two new divisions to meet the increasing demand for these products. Thus, the St. Charles Hospital Div. was formed in 1951, and the School Div. was organized in 1956. Today the firm has a staff of 18 direct salesmen selling hospital and school storage equipment.

Sales of St. Charles kitchens are handled through a nationwide network of over 200 dealers who assist the customer in the planning of the kitchen and submit detailed specifications to the plant. These dealers must "combine the special talents and techniques of the architect, the designer and the engineer."

In 25 years St. Charles has proved the soundness and profitability of its policy — give the customer exactly what she wants by custom manufacturing on a "by-order" basis.

is a six-stage cleaning and phosphating treatment. The six stages are as follows:

1. High detergent cleaner; 90-95 F; 950-gallon tank.
2. Overflow water rinse; 85-100 F; 950-gallon tank.
3. Phosphating; 110-115 F; 1200-gallon tank.

4. Overflow water rinse; 80-100 F; 600-gallon tank.

5. Acid rinse; 80-130 F; 600-gallon tank.

6. Deionized water rinse; room temperature; 250-gallon tank.

Following a 360 F dry-off in a gas-

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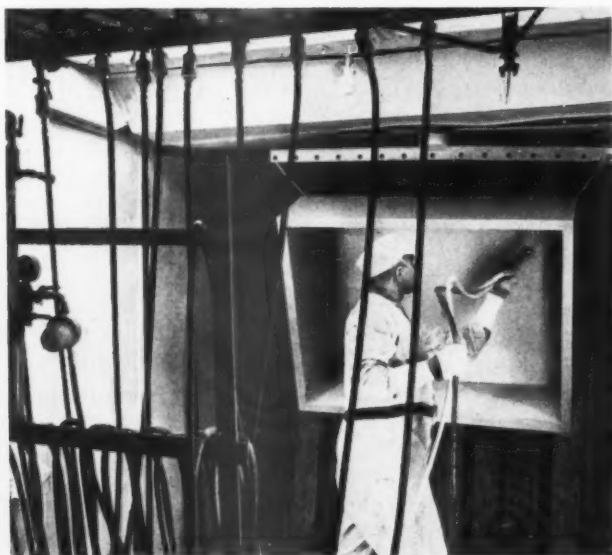


Color changes are accomplished by snapping off one paint hose, bleeding the spray gun, and snapping on another hose.



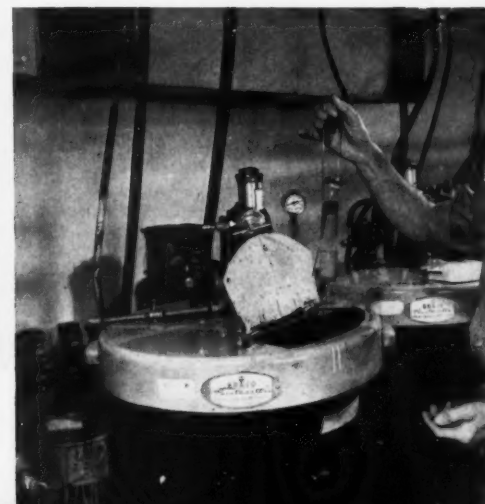
Spacious, clean paint storage room located below finishing department has 16 circulating tanks for supplying stock colors to spray booths. Remainder of stock colors are supplied from pressure tanks located in booths.

MPM PHOTOS



(Left) — Application of final coat. Note hoses in foreground which carry some of the company's 22 stock colors.

(Below) — Regular viscosity tests are run with No. 2 Zahn cup.





## MARPROOF FINISHES THAT FOIL STAINING TOO ...M&T TEXTURED AND SMOOTH SPRAY-ON VINYL

Beauty...distinctiveness...color...you get all of these visual qualities with the new spray-on vinyl finishes from M&T.

But that's only half the story. These coatings give your product a lasting coat of "armor" that withstands just about all the rough service users can give it. The finish absorbs impact without chipping, doesn't fade, won't stain despite constant handling.

With this *sprayable* vinyl coating you can cover even the most complex parts (impracticable with laminated vinyl finishes). It produces a rich-looking texture or satin-smooth finish on plain surfaces...or reproduces the design of patterned metal.

Designers and producers of appliances will find M&T coatings ideally suited to their products. Not just for decorative texture and eye-appeal, but for long-term *durability*. There is hardly a finish that offers so much resistance to service hazards such as food acids, household chemicals, detergents, alcohol and water. Write for more information.



### COATINGS & FINISHES

METAL & THERMIT CORPORATION  
General Offices: Rahway, New Jersey  
In Canada: M&T Products of Canada, Ltd., Hamilton, Ont.

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## MPM

### Industry meetings

#### PORCELAIN ENAMEL

The 30th Annual Meeting of the Porcelain Enamel Institute, The Greenbrier, White Sulphur Springs, W. Va., October 5-7, 1961.

#### INDUSTRIAL DESIGNERS

The 17th Annual Meeting of the American Society of Industrial Designers, Ambassador Hotel, Los Angeles, Calif., October 5, 1961, and St. Catherine Hotel, Santa Catalina Island, October 6-8, 1961.

#### MAGNESIUM

The 17th Annual Convention of The Magnesium Association, Belmont Plaza Hotel, New York City, N. Y., October 16-18, 1961.

#### PACKAGING FORUM

The Packaging Institute's 23rd Annual National Packaging Forum, Hotel Biltmore, New York City, N. Y., October 18-20, 1961.

#### QUALITY CONTROL

The 16th Midwest Conference of the American Society for Quality Control, Hotel Chase-Park Plaza, St. Louis, Mo., October 19-20, 1961.

#### METAL SHOW

The 1961 Detroit Metal Show and ASM Materials Comparison Center, sponsored by American Society for Metals, Cobo Hall, Detroit, Mich., October 23-27, 1961, and 43rd National Metal Congress, presented by American Society for Metals and eight participating organizations, Cobo Hall, Detroit, October 23-27, 1961.

#### HOME LAUNDRY CONFERENCE

The American Home Laundry Manufacturers' Association's 15th National Home Laundry Conference, Pick-Congress Hotel, Chicago, Ill., October 25-27, 1961.

#### AUTOMATIC MERCHANDISING

National Automatic Merchandising Association's 1961 Convention-Exhibit, McCormick Place and Conrad Hilton Hotel, Chicago, Ill., October 28-31, 1961, and the First International Symposium of Automatic Merchandising, October 31-November 1, McCormick Place.

#### PAINT TECHNOLOGY

The 39th Annual Meeting and 26th Paint Industries' Show of the Federation of Societies for Paint Technology, Shoreham Hotel, Washington, D. C., October 31-November 4, 1961.

#### PEI SHOP PRACTICE FORUM

The Porcelain Enamel Institute's 23rd Shop Practice Forum, The Ohio State University, Columbus, Ohio, November 1-3, 1961.

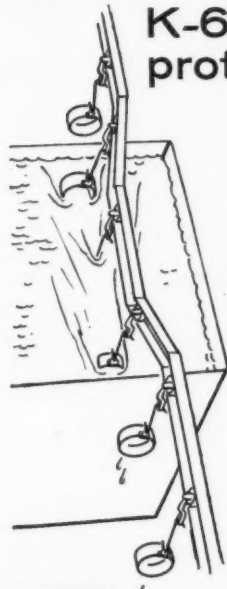
#### APPLIANCE TECH. CONFERENCE

The Third Western Technical Conference, sponsored by the Los Angeles Section of the American Institute of Electrical Engineers, Biltmore Hotel, Los Angeles, Calif., November 6, 1961.

TO PAGE 87 →

## NEW from KERNS UNITED

### K-6882 rust protective cleaner



cleans parts, guards against rust during processing and storage

This new alkaline compound by Kerns United has been developed primarily for power washer applications. It's a low foaming product that combines efficient cleaning of shop oils and dirt with effective rust protection of parts during processing or storage. It will not stain and is exceptionally easy to control.

*2 Ounces of K-6882 per gallon of solution will protect parts against rust and stain longer than five days in 98% relative humidity.*

Ask Kerns United for full details on the new K-6882 Alkaline Rust Protective Cleaner. And if you draw, cut, grind or forge metals, Kerns United has or can formulate a *personalized* lubricant that will save you production dollars. Call, wire, or write for information today.



#### KERNS UNITED Corporation

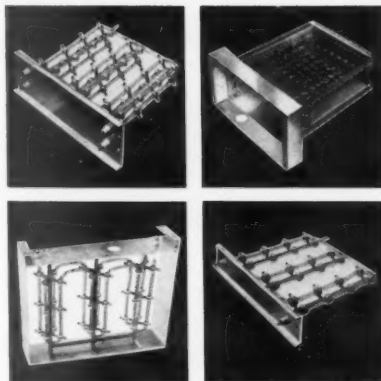
824 State Street • Calumet City, Illinois

Subsidiary: Kerns Pacific Corporation

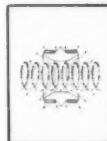
630 N. Batavia St., Orange, Calif.

PERSONALIZED LUBRICANTS FOR INDUSTRY

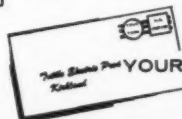
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CROSS-SECTIONAL VIEW OF NEW TEP INSULATOR AND CROSS-BAR DESIGN.



More space for air circulation assures better heat dissipation, longer wire life. Another result of TEP research.



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#### TUTTLE ELECTRIC PRODUCTS, Inc.

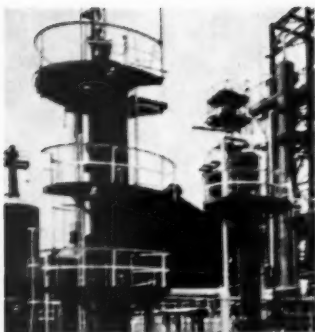
Kirkland 2, Illinois

Phone 2-3321

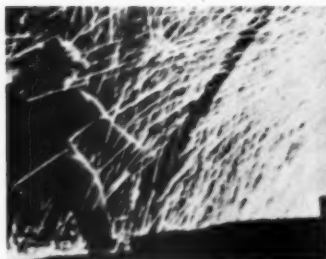
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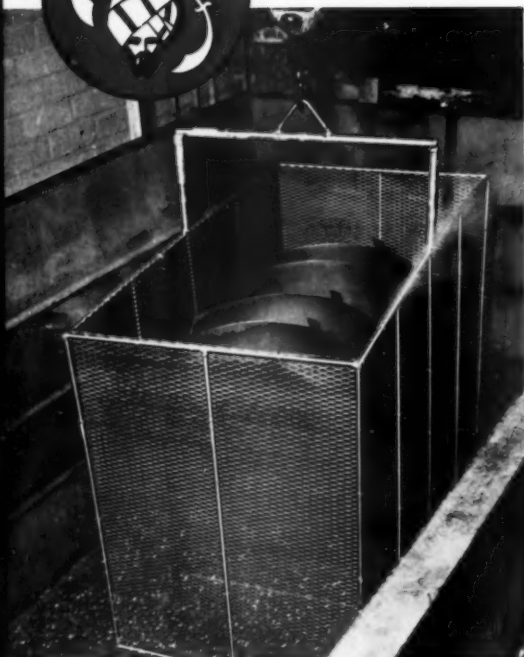
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working  
industry**



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*turn to Turco... First!*





**WANT MORE DETAILS?** Technical Data Bulletins are available on all of the products charted here, as well as on the other compounds that comprise the complete Turco line of alkaline-type cleaners.

## ALKALINE-TYPE CLEANERS

BASIC PURPOSE	PRODUCT NAME	
Heavy-duty hot tank cleaner. Ideal for pre-cleaning prior to phosphating, painting or galvanizing.	PETRO-KLENE	Ferrou
Heavy-duty, low-foaming hot tank cleaner, designed for cleaning during manufacture, fabrication and overhaul. Can be heavily agitated. Performs at peak efficiency over amazingly long and sludge-free tank life.	FERREX B	Ferrou
Heavy-duty, non-foaming spray washing compound, especially designed for production-line schedules.	KWIK-SPRAY	Ferrou
Low temperature, non-foaming spray washing or tank cleaner, specifically designed for use prior to phosphating.	TURCOLD CLEANER	Ferro mag dust
For top quality, most efficient hot tank cleaning of aluminum and other reactive metals. Non-foaming at operating temperature...even when violently agitated.	AVIATION	All
Non-silicated spray washing or hot tank cleaner for aluminum. Non-foaming...even when heavily agitated. Absolutely eliminates bake-on. Ideal for use prior to spot welding, vitreous enameling or anodizing.	TURCO 4215	Alu zin

## ACID CLEANING & PASSIVATING



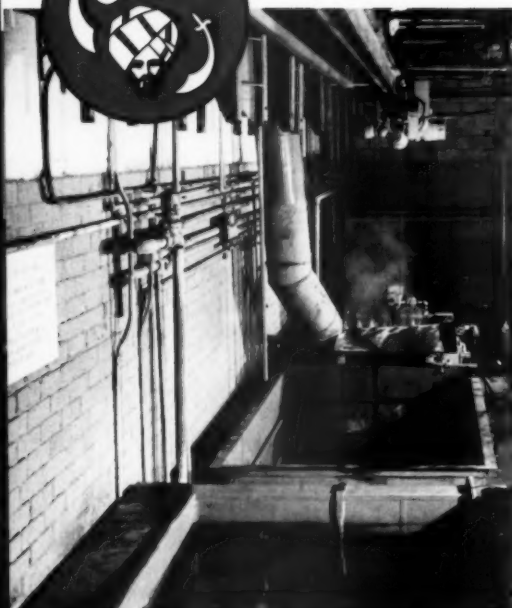
**WANT MORE DETAILS?** Technical Data Bulletins are available on all of the products charted here, as well as on the other materials that comprise the complete Turco line of compounds for acid cleaning and passivating.

BASIC PURPOSE	PRODUCT NAME	
Simultaneously removes grease, dirt, shop soils, oxides, corrosion; produces decorative satin finish on aluminum; promotes better paint adhesion.	W. O. #1	
Highly concentrated version of W. O. #1 for use where heavier rust-removal and/or etching is desired.	W. O. #2	
Cold tank rust, scale and corrosion remover. Inhibited against attack on base metal.	DE-SCALER	
Non-dusting, easily dissolved, granular hot or cold tank compound for cleaning and removal of rust, scale, welding flux residues, etc. Ideal for acid burnishing.	SCALE-GO	

	METALS USED ON	SOILS REMOVED	TYPE OF RINSE	HOW USED
	Ferrous metals and magnesium.	Grease, drawing compound, forming oils and other adhesive soils.	Hot water. Leaves water-break-free surface.	4-8 oz/gal water. 180°F. to boiling.
	Ferrous metals and magnesium.	Carbon, paint, grease, gums, engine varnish.	Hot water. Leaves water-break-free surface.	4-6 oz/gal water. 180°F. to boiling. Use with or without agitation.
	Ferrous metals and magnesium.	Heavy grease, drawing compounds, fingerprints, metal chips and forming oils.	Hot water. Leaves water-break-free surface.	1-2 oz/gal water. 160-190°F.
	Ferrous metals, zinc, cadmium, magnesium & aluminum (industrial applications).	Grease, oil, drawing compound, shop soils.	Warm water. Leaves water-break-free surface.	SPRAY: $\frac{1}{8}$ -2 oz/gal water. 100-180°F. DIP: 2-6 oz/gal water. 100-180°F.
	All metals.	Machine oil, metal chips, drawing compounds, identification inks, fingerprints, grease, oil.	Hot water. Leaves water-break-free surface.	4-6 oz/gal water. 175-185°F. Must be air agitated.
15	Aluminum, ferrous metals, zinc, cadmium, copper alloys.	Machine oil, grease, metal chips, drawing compounds, marking inks, fingerprints.	Warm water. Leaves water-break-free surface.	SPRAY: 1-2 oz/gal water. 160-170°F. DIP: 6 oz/gal water. 160-170°F. Must be air agitated.

	METALS USED ON	FLAMMABILITY	HOW USED
	Aluminum, aluminum alloys, cadmium, ferrous metals, zinc coated metals.	Non-flammable. Flash point exceeds 150°F.	WIPE: 1 part W. O. #1 to 4 parts water. Wipe off rinse with clean damp rags. DIP: 1 part W. O. #1 to 3-4 parts water at room temperature to 190°F. Rinse with hot or cold water.
	Aluminum, aluminum alloys, cadmium, ferrous metals, zinc coated metals.	Non-flammable.	WIPE: 1 part W. O. #2 to 6 parts water. Wipe off rinse with clean damp rags. DIP: 1 part W. O. #2 to 5-6 parts water at room temperature to 190°F. Rinse with hot or cold water.
	Iron, steel, bronze, brass.	Non-flammable.	1 part De-Scaler to 3-20 parts water by immersion or circulation. Rinse with cold water.
	Ferrous metals, copper alloys, aluminum.	Non-flammable.	4-10 oz/gal water at room temperature to 150°F. Rinse with water, preferably warm.





**WANT MORE DETAILS?** Technical Data Bulletins are available on all of the products charted here, as well as on other compounds that comprise the *complete* Turco line of paint and carbon removers.

## PAINT & CARBON REMOVERS

BASIC PURPOSE	PRODUCT NAME	
Combines high alkalinity with direct-action solvents. Low foaming... can be agitated. Designed for production-line schedules.	<b>FERROCLEAN</b>	Ferrous titanium bronze
Heavy-duty combination cleaner and hot tank paint stripper for use where agitation is not desirable. Non-caking, non-dusting, easily dissolved alkaline powder.	<b>FERROSTEIP</b>	Ferrous titanium
Non-flammable two-layer hot tank carbon remover and paint stripper. Combines the advantages of cold and hot tank strippers. Unsurpassed where heating facilities are available.	<b>CARBOSTRIP</b> (T. M. Pending)	All metals
America's standard carbon remover. Non-flammable two-layer cold tank material. Bottom layer contains powerful cleaning solvents. Top layer is a chemical seal that retards evaporation... minimizes drag-out... aids in rinsing.	<b>TRANSPO</b>	All metals
A new "super Transpo." Extra solvency... longer life... faster.	<b>SUPER-CARB</b>	All metals
Non-phenolic, non-flammable two-layer cold tank carbon and paint remover. Eliminates phenolic disposal problems.	<b>TURCO-CARB</b>	All metals

## SOLVENT & EMULSION CLEANERS

BASIC PURPOSE	PRODUCT NAME	
Safety solvent to replace carbon tetrachloride in cleaning operations. For in-place cleaning of electrical equipment, hand wiping of small parts, removal of grease pencil, chalk or ink, pre-cleaning, and a host of other cleaning jobs incident to plant maintenance.	<b>TURCO-SOLV</b>	Far better than conventional solvents. No mess, no fumes, no fire hazard.
Heavy-duty solvent emulsion cleaner, for removal of oily, greasy, gummy coatings by a simple cold spray application.	<b>MULSIREX</b>	Safety solvent. No fumes, no fire hazard. No mess, no fumes, no fire hazard.
Water-base emulsion cleaner for general maintenance of aluminum and painted surfaces.	<b>JET-CLEAN #2</b> (T. M. Pending)	Safety solvent. No fumes, no fire hazard. No mess, no fumes, no fire hazard.

**WANT MORE DETAILS?** A four-page illustrated folder and Technical Data Bulletin are available on Turco-Solv. Technical Data Bulletins are also available on the other products that comprise the *complete* Turco line of solvent cleaners.

NAME	METALS USED ON	SOILS REMOVED	TYPE OF RINSE	HOW USED
AN	Ferrous metals, magnesium, titanium, brass, copper, red bronze.	Heavy carbon, paint, grease, heat hardened resins. Loosens asphalt tar.	Hot water at 150°F. or higher. Agitation desirable. Steam or high pressure water.	4-8 oz/gal water. 190°F. to boiling. Use with or without agitation.
IP	Ferrous metals, magnesium, titanium.	Carbon, paint, grease, oil.	Hot water at 150°F. or higher. Agitation desirable. Steam or high pressure water.	4-8 oz/gal water. 180-210°F.
RIP	All metals.	Extra heavy baked-on carbon, alkali-resistant paint, grease, engine varnish.	Hot water at 150°F. or higher. Agitation desirable. Steam or high pressure water.	Full strength at 140-150°F.
O	All metals.	Heavy carbon, paint, heavy grease, engine varnish, sticky gums and other obdurate soils.	Hot water at 150°F. or higher. Agitation desirable. Steam or high pressure water.	Full strength at room temperature.
RB	All metals.	Heavy carbon, paint, heavy grease, engine varnish, sticky gums and other obdurate soils.	Hot water at 150°F. or higher. Agitation desirable. Steam or high pressure water.	Full strength at room temperature.
RB	All metals.	Carbon, heat formed engine varnish, sticky gums, oil, grease, baked-on paints.	Hot water at 150°F. or higher. Agitation desirable. Steam or high pressure water.	Full strength at room temperature.

NAME	SAFETY FACTOR	FLASH POINT	HOW USED
LV	Far less toxic than carbon tetrachloride. Non-conductive. Non-corrosive and safe on all metals, paint and air-dried insulating varnish.	TCC: Displays no flash point. TOC: Over 180°F.	Full strength by pressure pot or hand wipe. No rinsing required.
X	Safe on all metals, paint, wiring insulation, decals. Non-toxic. Non-hazardous to personnel. Non-irritating to skin.	Greater than 180°F. (COC)	1 part Mulsirex to 8-30 parts kerosene distillate or Diesel fuel oil. Apply by portable sprayer, dip, brush or swab. Rinse with hose, high pressure water or steam.
#2	Safe on all metals, paint, wiring insulation, decals, plexiglas, plastic, leatherette. Non-toxic. Non-hazardous to personnel. Non-irritating to skin.	Displays no flash point to boiling.	1 part Jet Clean #2 to 3-10 parts water. Apply by portable sprayer, dip, brush, swab or hand wipe. Rinse with high pressure water.

**WANT MORE DETAILS?** A four-page illustrated folder is available on the complete Turco line of emulsion cleaners. Technical Data Bulletins are available on all of the products charted here, as well as on the other compounds that comprise the balance of Turco's emulsion cleaner line.



# TURCOAT MATERIALS...

	BASIC PURPOSE	PRODUCT NAME	TYPE OF COATING	RECOMMENDED USES	METHOD AND DIPPING
1	SIMULTANEOUS CLEANING AND LIGHT PHOSPHATING OF METALS—A superior cleaner; produces light, very smooth phosphate coating; assures paint adhesion; prevents rapid re-rusting of steel before painting; low sludging.	PAINTITE	Phosphate of the metal to which applied; e.g., iron phosphate, zinc phosphate.	On any steel components: such as cabinets, lockers, heaters, structural parts, furniture, trucks, tractors, road building equipment, air conditioning units, etc.	Spray was Dip: 3 Steam
2	PROTECTS ALUMINUM AGAINST CORROSION AND ASSURES PAINT ADHESION—Provides aluminum with a chrome-type chemical film or coating of the surface conversion type.	ALUMIGOLD (Golden Colored) TURCOAT 4354 (Colorless)	Amorphous aluminum and chromium compounds.	On any aluminum components: such as aircraft parts, structural building parts, household appliances, truck, coach, and house trailer bodies, aluminum sheets, bins and partitions, ornamental aluminum, aluminum siding, aluminum boats, etc.	Spray was Dip: 3 Hand Br rol
3	AS A BOND FOR PAINT—Smooth, tight phosphate coating as a bond for paint; also for metal drawing. Heavy coating for parts to be oiled for rustproofing.	TURCOAT 4333 TURCOAT 4432	Zinc phosphate.	On any fabricated parts: such as auto body parts, sheet metal components, refrigerator, heater and washing machine parts, projectiles, bombs, mines, metal drawings, etc.	Spray wi Dip:
4	LOW TEMPERATURE PHOSPHATING PROCESS for providing smooth, tight phosphate coating as a bond for paint; also for metal drawing.	LOW TEMP	Zinc phosphate.	On any fabricated parts: such as auto body parts, sheet metal components, refrigerator, heater and washing machine parts, projectiles, bombs, mines, metal drawings, etc.	Spra di Dip:
5	ANTI-FRICTION COATING AND FOUNDATION FOR OIL OR PAINT—Substantial phosphate coating for moving parts; rustproofing of small parts to be oiled in mass production; foundation for oil or paint.	TURCOAT 3557 TURCOAT 3797	Manganese and iron phosphates.	Pistons, gears, crankshafts, ordnance parts, clips, bolts, nuts, fasteners, tools, compressor shafts, lubrication boxes, etc.	Dip 5
6	FOR CLEANING AND PHOSPHATING THROUGH A STEAM CLEANER.	TURCOAT 4347	Phosphate of metal to which applied; e.g., iron phosphate, zinc phosphate.	On parts too large or cumbersome for immersion or spray washing. Ideal for use on road graders, farm machinery, etc.	Ste
7	RUST REMOVAL, CLEANING & METAL CONDITIONING to improve paint adhesion.	W. O. #1 W. O. #2	Phosphate of the metal to which applied.	Auto bodies, fenders, sheet steel components, aluminum components, жалousies, cabinets, lockers, heaters, structural parts, aircraft parts, structural building parts, ornamental aluminum, etc.	Ha Dip



# ... provide a Better Bond for Organic Finishes

METHOD OF APPLICATION AND EQUIPMENT	METALS AND COATING WEIGHT	OPERATION CYCLE	
Spray: 3-5 stage spray washer. Dip: 3-5 tank system. Steam cleaning machine.	Iron, steel, zinc. Up to 70 mg/sq. ft. (on steel).	<b>SPRAY</b> ..... Stage 1—Turco Paintite, 1-2 oz/gal; 140-170° F. (3 stage washer)*: Stage 2—Water Rinse, 120-140° F. Stage 3—Hibi-Rinse or Chromic Acid, ½ lb/100 gal water; 140-180° F. <b>DIP</b> ..... Tank 1—Turco Paintite; 2-4 oz/gal; 160-170° F. (3 tank system—agitated tanks)*: Tank 2—Water Rinse, 120-140° F. Tank 3—Hibi-Rinse or Chromic Acid ½ lb/100 gal water; 140-180° F. <b>STEAM CLEANER</b> ..... Concentration in concentrate tank: 6 oz/gal; at nozzle: ½ oz/gal.	*Consult Technical Data Bulletin for 5-stage systems.
Spray: 5 or 7 stage washer. Dip: 5 or 7 tank system. Hand Methods: Brush, swab, flow on, roll on, etc.	Aluminum and its alloys.	<b>1. PRE-CLEANING</b> ..... Dip: Turco Airlion or Turco 4215, 4-6 oz/gal; 160-180° F. Spray: Turco 4215, ½-2 oz/gal; 150-180° F. <b>2. RINSE</b> ..... Water, 120-140° F. <b>3. DEOXIDIZING*</b> ..... (if required): Turco Smut-Go, 8-12 oz/gal; 75-85° F. <b>4. RINSE</b> ..... Water; Ambient. <b>5. TURCOATING</b> ..... Dip: Turcoat Alumigold or Turcoat 4354, 1-1½ oz/gal; 75-85°F.; 3-5 minutes. Spray: Turcoat Alumigold or Turcoat 4354, 1-1½ oz/gal; 90-100° F.; 15 sec minimum. <b>6. RINSE</b> ..... Water: Ambient or Lukewarm. <b>7. CHROMIC ACID RINSE</b> ..... ¼ lb/100 gal water; ambient or lukewarm.	*Consult Technical Data Bulletin for alloys requiring deoxidation.
Spray: 5 stage washer with drier. Dip: 5 tank system.	Iron, steel, zinc, cadmium. Up to 1000 mg/sq. ft.	<b>SPRAY</b> Stage 1—Clean: Turcold Cleaner ¼-2 oz/gal; 100-180° F. Stage 2—Water Rinse: 120-140° F. Stage 3—Turcoat 4432 or Turcoat 4333 1-3 gal/100 gal water; 140-180° F.; 1 minute. Stage 4—Water Rinse: Ambient. Stage 5—Turcoat Hibi-Rinse or Chromic Acid ½ lb/100 gal water; 140-180° F. <b>DIP</b> Tank 1—Clean: Turco Petro-Klene 4-6 oz/gal; 160-190° F. Tank 2—Rinse: Water 120-140° F. Tank 3—Turcoat 4432 or Turcoat 4333 1-3 gal/100 gal water; 140-180° F.; 2-10 minutes. Tank 4—Rinse: Water, Ambient. Tank 5—Turcoat Hibi-Rinse or Chromic Acid: ½ lb/100 gal water; 140-180° F.	
Spray: 5 stage washer with drier. Dip: 5 tank system.	Iron, steel, zinc, cadmium. Up to 800 mg/sq. ft.	<b>SPRAY</b> Stage 1—Clean: Turcold Cleaner, ¼-2 oz/gal; 100-120° F., 1-2 min. Stage 2—Rinse: Water 85-95° F. Stage 3—Turcoat Low Temp 1½-3 gal/100 gal water; 100-110° F.; 1 minute. Stage 4—Rinse: Water, Ambient. Stage 5—Turcoat Hibi-Rinse or Chromic Acid, ½ lb/100 gal water; 85-95° F., ½ min. <b>DIP</b> Tank 1—Clean: Turcold Cleaner; 2-6 oz/gal; 100-120° F.; 5-10 minutes. Tank 2—Rinse: Water 85-95° F. Tank 3—Turcoat Low Temp; 1½-3 gal/100 gal water; 100-110° F.; 5-15 minutes. Tank 4—Rinse: Water, Ambient. Tank 5—Turcoat Hibi-Rinse or Chromic Acid; ½ lb/100 gal water; 85-95° F., ½ min.	
Dip (including tumbling): 5 tank system.	Iron, steel, cadmium. Up to 3000 mg/sq. ft.	<b>TANK 1</b> ..... Clean: Turco Petro-Klene, 4-6 oz/gal water; 160-190° F. <b>TANK 2</b> ..... Rinse: Water 120-140° F. <b>TANK 3</b> ..... Turcoat 3557 or Turcoat 3797; 6-7 gal/100 gal water; 15-30 minutes; 200-210° F. <b>TANK 4</b> ..... Rinse: Water: Ambient. <b>TANK 5</b> ..... Turcoat Hibi-Rinse or Chromic Acid: ½ lb/100 gal water; 140-180° F.	
Steam cleaning machine.	Iron, steel, zinc. Up to 50 mg/sq. ft.	Concentration in concentrate tank: 6 oz/gal; at nozzle: ½ oz/gal.	<b>WANT MORE DETAILS?</b> A six-page illustrated folder is available on the complete Turcoat line of phosphating processes. Technical Data Bulletins are available on all of the processes charted here, as well as on the other processes that comprise the balance of the Turcoat phosphating line.
Hand wipe or hand spray. Dip: 2 tank system.	Primarily rust and corrosion removal, light cleaning and metal conditioning. Iron, steel, aluminum, zinc, cadmium, copper alloys.	<b>HAND WIPE OR HAND SPRAY:</b> 10-25% by volume at room temperature. Water rinse preferable. <b>DIP:</b> 10-50% by volume at room temperature to 190° F. Water rinse at room temperature to 180° F.  Consult Technical Data Bulletin for specific use information.	



**WANT MORE DETAILS?** Technical Data Bulletins are available on all of the products charted here, as well as on the other materials that comprise the *complete* Turco line of compounds for paint booth maintenance.

## PAINT DEPARTMENT – DEFLOCCULATING

BASIC PURPOSE	PRODUCT NAME
Non-caking, non-dusting powdered deflocculator for all water-wash paint spray booths.	DEFLOCCULATOR #2
Easily mixed thick liquid deflocculator for all water-wash paint spray booths.	LIQUI-FLOC

## PAINT DEPARTMENT – MASKING



BASIC PURPOSE	PRODUCT NAME
Hard and tough bright white coating for walls, floors, ceilings, spray booth equipment. Takes heavy foot and truck traffic. Gives maximum light reflection. Dries in 30-45 minutes.	DURAMASK
Non-drying coating for spray booth walls and ceilings. Ready for use immediately upon application. Dull white.	MASQ-IT
Easily removable hard coating for spray booth walls and ceilings. Dries in 5-15 minutes. Medium white.	PEEL-OFF

## PLATING DEPARTMENT

**WANT MORE DETAILS?** Technical Data Bulletins are available on all of the products charted here, as well as on the other materials that comprise the *complete* Turco line of compounds for pre-cleaning prior to plating.

BASIC PURPOSE	PRODUCT NAME
Non-foaming, non-silicated combination electrolytic hot tank or spray washing cleaner. Designed for high-speed strip pre-cleaning.	ELECTRO 3859
Heavy-duty electrolytic cleaner for use prior to plating. Exceptionally long-lived. Extremely high current conductivity.	POROKLEEN®
Combination pre-cleaner and rust remover that eliminates need for acid pickling to remove light rust prior to plating. Used electrolytically or in "still" tank.	SURJ®
Still tank scrubber for heavy-duty cleaning of light metals prior to plating.	SOLUSOIL

## FINISHES HANDLED

ENAMELS AND EPONS	ASPHALT BASE	METALLICS	VARNISHES	PRIMERS	FOAM FACTOR	FLOTATION FACTOR	HOW USED
Very Good	Excellent	Very Good	Excellent	Excellent	Very Low	High	$\frac{1}{8}$ - $\frac{1}{2}$ oz/gal water
Very Good	Excellent	Excellent	Very Good	Very Good	Very Low	Very High	1-2 qts per 100 gal water

## PERSONNEL HAZARD

## INHIBITED FOR RUST

## HOW TO USE

Safe	Yes	Mix 3 parts Duramask with 1 part water. Apply by brush or spray. Remove with soak and water wash.
Safe	Yes	Apply full strength Masq-It by brush or spray. Remove by scraping or with water wash.
Safe	Yes	Apply Peel-Off full strength by spray. Remove by hand in sheets.

## METALS USED ON

## HOW USED

Ferrous metals only.	Electrolytic (reverse or periodic reverse): 4-12 oz/gal water. 180-200°F. SPRAY: $\frac{1}{8}$ -2 oz/gal water. 140-180°F.
Ferrous metals, copper alloys, brass, zinc die castings.	CATHODIC (direct): 6-8 oz/gal water. 160-190°F. ANODIC (reverse): 10-12 oz/gal water. 160-190°F. 3-4 oz/gal water. 160°F. maximum for copper and zinc alloys.
Ferrous metals, magnesium.	Electrolytic (direct or reverse): 8-12 oz/gal water. 190-200°F. SOAK: 8-12 oz/gal water. 200-210°F.
Ferrous metals, zinc, zinc coated metals, die cast, brass, bronze.	4-6 oz/gal water. 160-200°F.



## ALKALINE-REMOVABLE PROTECTIVE COATINGS

BASIC PURPOSE	PRODUCT NAME	HOW APPLIED	HOW REMOVED
Easy-to-remove coating that protects metal from abrasion and corrosion during inside storage, forming and fabrication. Applied upon receipt of raw stock. Removed prior to organic or other finishing.	<b>FABRIFILM</b>	Apply full strength by immersion, flow coat, brush, roller coat or spray.	<p>Prior to Final Assembly: Easily, quickly and completely removed by alkaline hot tank, spray washing or steam cleaning compounds at the same time parts are being cleaned prior to final surface preparation.</p> <p>From Assembled Objects: Spray on Turco Fabrifilm Remover. Flush coating off with water.</p> <p>Spot Removal: Brush on Turco Wipe-Solv. Wipe off coating with cloth dampened with Wipe-Solv.</p>
Easy-to-remove coating that protects large aluminum products from weathering and scratching during fabrication, storage and shipment.	<b>ALUMIFILM</b>	Apply full strength by immersion, flow coat, brush, roller coat or spray.	<p>From Assembled Objects: Spray on Turco Fabrifilm Remover. Flush coating off with water.</p> <p>Spot Removal: Brush on Turco Wipe-Solv. Wipe off coating with cloth dampened with Wipe-Solv.</p> <p>Prior to Final Assembly: Where practical, coating is easily removed by alkaline hot tank, spray washing or steam cleaning compound simultaneously with cleaning prior to final surface preparation.</p>

**WANT MORE DETAILS?** Illustrated literature and Technical Data Bulletins are available on both Fabrifilm and Alumifilm.

## ALUMINUM SPECIALTIES

BASIC PURPOSE	PRODUCT NAME	SPECIFIC APPLICATIONS	HOW USED
Simultaneous cleaning and etching, providing a smooth uniform matte finish on aluminum.	<b>ALUMINETCH #2 SMUT-GO #2</b>	Aluminum components, structural aluminum building materials such as extrusions and sheets that make up store fronts. Aircraft parts, truck, bus and house trailer bodies, etc.	<p>Aluminetch #2: 5-7 oz/gal water. 140-150°F. 3-5 minutes.</p> <p>Rinse: Warm water.</p> <p>Smut-Go #2: 16 oz/gal water. Room temperature.</p> <p>Rinse: Cold water.</p>
For deoxidizing aluminum after cleaning and prior to spot welding. Provides the chemically clean, oxide-free surface so essential for successful spot welding.	<b>SMUT-GO #1</b>	Aircraft parts, structural building parts, aluminum sheets, extrusions, ornamental aluminum, other aluminum components.	8-16 oz/gal water. Room temperature. 5-10 minutes. Rinse with cold water.
For simultaneous cleaning, conditioning and brightening of aluminum surfaces. Removes corrosion products, oxides, light carbon and other light soils.	<b>TURCO 3002A</b>	Aircraft, truck, bus and house trailer bodies. Curtain walls. Structural and ornamental aluminum.	Apply by spray or brush full strength or diluted with up to 50% water, depending on degree of soil. Rinse with high-pressure water.

**WANT MORE DETAILS?** A six-page illustrated folder is available on the complete Turco line of compounds for chemical processing of aluminum. Technical Data Bulletins are available on all of the materials charted here, as well as on the other compounds that comprise the balance of Turco's aluminum processing line.

## RUST REMOVERS & PREVENTIVES

BASIC PURPOSE	PRODUCT NAME	SAFETY FACTOR	HOW USED
Non-acid, two-step, dip and rinse hot tank compound for simultaneous removal of rust, carbon, paint and primer from ferrous metals.	<b>ALKALINE RUST REMOVER</b>	Eliminates hazards encountered with acids. Contains no cyanides. Does not affect tolerances. Does not cause hydrogen embrittlement.	8 oz. to 3 lb/gal water. 200°F. to boiling. Rinse with high pressure water or steam.
Water-displacing rust preventive oil for use during shop storage or for indoor storage following cleaning or other processing operations.	<b>AQUASORB</b>	Non-corrosive to metals. Harmless to personnel. No disagreeable odor. Won't turn rancid.	Apply full strength by brush, spray, swab or dip. Do not rinse.
Combination water-emulsifiable cleaner and in-plant rust preventive for removal of light soils such as machining oil, chips and shop soil.	<b>TURCO 4454</b>	Safe on all metals. Non-hazardous to personnel. No fuming. No disagreeable odors. Exceedingly high flash point (over 300°F.)	Apply diluted 1 to 10% by volume in water at room temperature to 140°F. by dip or spray. Do not rinse.

**WANT MORE DETAILS?** A four-page illustrated folder is available on Alkaline Rust Remover. Technical Data Bulletins are available on the products charted here, as well as on the other compounds that comprise the *complete* Turco line of rust removers and preventives.

### PLANT MAINTENANCE

In addition to the products charted herein, Turco manufactures a complete line of compounds formulated to meet any plant maintenance need. Among these are spray-on paint removers, floor cleaners and waxes, rug and upholstery cleaners, dishwashing compounds, deodorants, disinfectants, germicides and general purpose cleaners. Literature is available on each product in the broad Turco line.



**DYE PENETRANT INSPECTING**—Eight-page illustrated booklet tells how to inspect metal parts accurately, simply, economically with Dy-Chek®...Turco's dye penetrant flaw location method.



**STEAM CLEANING**—Four-page illustrated folder describes Turco's *complete* line of steam cleaning compounds...customized to fit any steam cleaning need.



**HANDWASHING**—Two-page illustrated literature describes Turco's *complete* line of bacteriostatic and conventional handsoaps for use in the office and in the plant.



For years, Turco has led the chemical industry in the development of chemical processing compounds for the metal working industry. A number of these processes have been outlined in this folder. Many have been left out, due to space limitations. Your local Turco representative, whose address you will find listed on the back page, will be pleased to provide you with additional technical information on processes of interest to you. You'll find that he is highly skilled in the field of surface-active chemicals and is backed by the most extensive research and engineering staff in the chemical cleaning industry. Technical Data Bulletins containing complete information on each of the processes outlined herein are available upon request and should be consulted for optimum results.

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# YOUR OWN TURCOMAN IS AS NEAR AS YOUR PHONE

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Contact Turco  
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or cleaning problems  
or need any  
technical information

**TURCO  
PRODUCTS  
INC.**



## *Chemical Processing Compounds*

24600 South Main Street, Wilmington, California

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Albany, N.Y., See Schenectady	
Albuquerque, N.M., P.O. Box 155	CHapel 3-358
Allentown, Pa., P.O. Box 51	HEmlock 3-155
Atlanta 24, Georgia, 200 Ottley Drive, N.E., P.O. Box 13585, Station K	876-260
Austin, Texas, P.O. Box 450	HOmestead 5-163
Bakersfield, Calif., P.O. Box 1204	FAirview 7-216
Baltimore, Maryland, 12 E. 21st Street	BEImont 5-719
Beaumont, Texas, 1687 Avenue F	TErminol 2-440
Binghamton, New York, 94 Henry St.	RAymond 2-894
Birmingham, Ala. 512 No. 18th Street	ALpine 2-515
Boise, Idaho, 1310 State Street	3-544
Boston, Mass., See Newton	
Bridgeport, Conn., 281 Fairfield Ave.	EDison 3-419
Buffalo, N.Y., 305 Walbridge Bldg.	CLeeland 279
Cedar Rapids, Iowa, Guaranty Bldg.	EMpire 2-033
Charlotte, 1, N.C., P.O. Box 574	333-504
Chattanooga 3, Tenn., 871 McCallie Ave.	AMhurst 6-322
Chicago, Illinois	BLishop 2-163
Cincinnati 37, Ohio, 1717 Section Rd.	REdwood 1-883
Cleveland, Ohio, 1468 W. Ninth St.	MAin 1-464
Columbia, S.C., 2710 Preston St.	ALpine 2-367
Columbus, Ohio, 101 N. High St.	224-344
Dallas, Texas, 3191 Commonwealth Dr.	MEIrose 1-4650
Dayton, Ohio, See Springfield	
Denver, Colo., 2101 Market St.	MAin 3-5347
Des Moines 10, Iowa, P.O. Box 1073	BLackburn 5-1593
Detroit, Mich., 20009 James Couzens Highway	VERmont 6-4318
El Paso, Texas, 2209 Mills Street	KEystone 3-7910
Erie, Pa. 2230 W. 8th St., Rm 22	GLendale 2-3026
Evansville 1, Indiana, 113 Northwest 5th St.	HArrison 4-7111
Ft. Worth 1, Texas, P.O. Box 932	EDison 5-4872
Fresno, Calif., 1430 Parallel Ave.	ADams 3-0181
Goshen, Indiana, P.O. Box 378	676-1521
Grand Rapids 2, Mich., 190 Monroe Ave. N.W.	GLendale 4-4755
Great Falls, Montana, 305 6th St., N.W.	GLendale 2-5609
Hartford 6, Conn. 157 Wethersfield Ave.	JAckson 2-7557
Houston 10, Texas, 1606 Henderson St.	CApitol 2-6141
Indianapolis, Ind., 325 Bankers Trust Bldg.	MEIrose 2-1461
Jackson, Miss., P.O. Box 1472	FLetwood 3-5538
Joliet, Illinois, P.O. Box 1161	SAratoga 3-9359
Kansas City, Mo., 360 Union Station, Kansas City	VIctor 2-4567
Little Rock, Ark., P.O. Box 462	LOcust 5-1053
Los Angeles, Calif.	
24600 S Main St., Wilmington, Calif.	SPruce 5-2111
Louisville 2, Ky. 118 N. 9th St.	JUniper 3-3357
Memphis 11, Tenn. 1473 Madison Ave. Rm 4	BRoadway 4-0996
Miami 48, Florida, P.O. Box 48-1008	TUxedo 7-4815
Milwaukee, Wis. 735 N. Water St.	BRoadway 3-5330
Minneapolis Minn., See St. Paul	
Nashville, Tenn., Maxwell House Hotel, Parlor D	ALpine 4-9494
New Orleans 1, La., 133 N. Front St.	JAckson 2-8771
New York 6, N.Y.	WHitehall 4-9173
Newton, Mass., 272 Centre Street	DEcatur 2-8958
Norfolk, Va., 707 Medical Tower Bldg.	MAdison 5-0561
Oakland, Calif.	ENterprise 1-0784
Oklahoma City 1, Okla. 15 N. Ellison	CEntral 2-1496
Omaha, Nebraska, 801 So. 15th Street	341-4174
Paterson, New Jersey, 8 Morris St.	ARmory 4-0322
Peoria, Illinois, First National Bank Bldg.	676-1521
Philadelphia, Pa., 6447 Market St., Upper Darby	GRanite 2-6011
Phoenix, Ariz., 2909 E. Pierson St.	ALpine 4-8380
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## Custom finishing

→ FROM PAGE 47

fired oven, an order number and color are marked on each piece. Next step is one of two hand spray booths for the prime coat, which, like the final coat, is an alkyd-base finish.

The prime coat is baked for 13 minutes at 340 F, and the parts are hand sanded prior to the application of the final coat. This coat is hand sprayed in one of the three final coat booths and also baked at 340 F for 13 minutes.

Color changes in the final finish spray booths are accomplished in less than 30 seconds. The operator merely snaps off one paint hose, bleeds the spray gun, and snaps on another hose.

Paint for 16 of the standard colors is supplied to the booths directly from circulating tanks located in the clean, spacious paint room in the "basement" of the plant, directly below the finishing department.

As the parts leave the final bake oven, they are 100 percent visually inspected and placed on a conveyor which carries them to the final assembly area. **MPM**

## Motor Wheel

→ FROM PAGE 39

two switches, a control shield, control bracket and instruction plate are all sub assembled to the control panel before installation. An air vent tube also forms a part of this sub assembly. A feed tube is then installed.

Controls are built up with the necessary brass fittings on a sub assembly bench adjoining the line.

The next step is the addition of two junction boxes. Wiring harnesses are then added to the junction boxes and to the motor for the fan assembly. This sub assembly is built up and wired about ten feet from the spot where it is used.

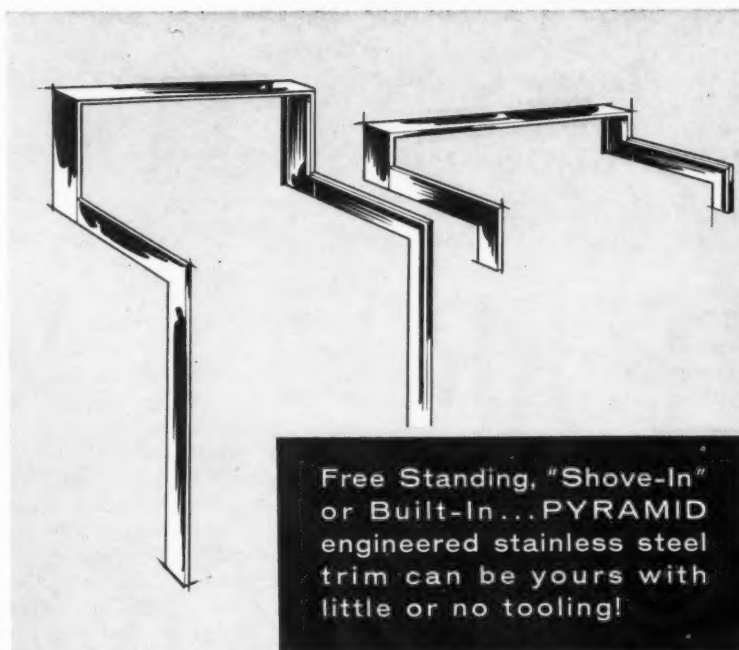
Strip and angle supports are added to provide cabinet rigidity.

At the next station on the line, one operator completes all of the wiring connections. Then an inspector adds the junction box covers, Canadian labels, an Underwriter's label, a cellophane cover for the control, and inserts an instruction book. Next, a packaged wall thermostat is added.

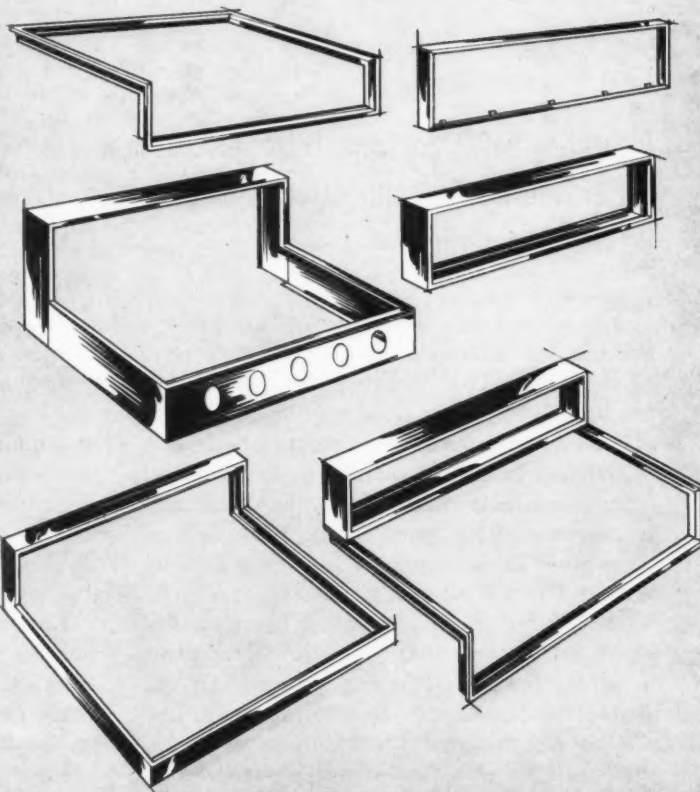
At the end of this roller conveyor, the fan is operated and all electrical parts checked.

Final assembly operation is the mounting of the front panel and the insertion of the completed unit in the shipping container. An up-ender then places the

TO PAGE 108 →



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# Fundamentals of drawability of sheet steel for porcelain enameling

by J. W. Frame, R. L. Whiteley, and D. J. Blickwede

STEEL FOR PORCELAIN ENAMELING is usually purchased as a flat sheet or a coil, and is formed into a more useful shape prior to enameling. A primary requirement is that the steel undergo this change in shape without breaking. The object of this article is to discuss some of the principles that will govern the success or failure of the drawing operation by which the flat sheet is changed into a more useful shape.

## Elements of deep drawing

Perhaps the simplest of all deep drawing operations is the forming of a cylindrical cup, but even this simple operation is not without some complexity. For example, Figure 1 shows the forming of two cylindrical cups of similar shape under grossly different forming operations.

In operation **A** the die has been designed to restrain the flow of metal over its face and the greatest deformation of the sheet occurs by *stretching* over the face of the punch. The degree of deformation is shown schematically in Figure 1 by the intensity of the shaded region of the blank. In operation **B**, on the other hand, through different die design and selective lubrication, the metal is formed by *drawing* over the die rather than by stretching. In the first operation the part is formed by *punch stretching*, in the latter operation by *die drawing*. Such stretching and drawing are essential elements of any drawing operation. All drawing operations, no matter how complex, are made up of some combination of these two basic mechanisms.

In actual drawing operations, punch stretching and die drawing rarely occur independently. However, some of the principles of deep drawing can be demonstrated by considering these two idealized cases separately. Considering Figure 2, in ideal punch stretching, deformation would occur only in the area of the blank over the die cavity as indicated by the shaded area. Conversely, during the ideal case of die drawing, deformation occurs principally in the area of the blank which was originally

under the holddown; that is, the outer portion of the blank.

In punch stretching, the maximum punch load,  $L_s$ , and the depth of the draw,  $D_s$ , are limited by necking of the metal which is being stretched over the head of the punch. The value of  $D_s$ , the depth of draw, is determined by the average deformation of the metal over the head of the punch at the point when necking occurs. The maximum load,  $L_s$ , corresponds to the punch load at this point.

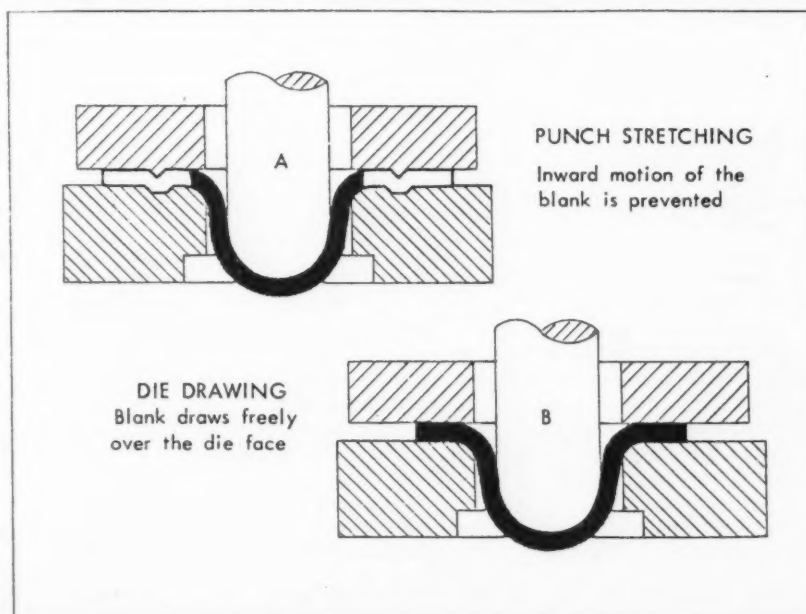
The case of die drawing is quite different. If a successful draw is made, the depth of draw,  $D_d$ , is determined by the blank size, the maximum depth corresponding to the point at which the entire blank has just been drawn completely through the die. The maximum punch load,  $L_d$ , is the maximum load required to draw the blank completely through the die. Unlike punch stretching, the maximum load in drawing is reached at some early stage in the drawing process. It usually occurs at the point when only one-third to one-half of the drawing has been completed. The

remainder of the drawing is then completed under a gradually decreasing load.

## Limits of deep drawing

The four parameters,  $L_s$ ,  $D_s$ ,  $L_d$ , and  $D_d$ , define the limits of deep drawing. To illustrate this we must consider the situation where both punch stretching and die drawing are occurring simultaneously. Where both stretching and drawing are occurring simultaneously, the total depth of draw is the sum of that due to each. The *maximum* amount which each can contribute individually is defined by the values of  $D_s$  and  $D_d$ , but it is rare indeed, when both contribute the maximum that they can to a draw. The proportion which they actually contribute is determined by the relative values of  $L_s$  and  $L_d$ . This is shown in Figure 3. As long as the maximum drawing load,  $L_d$ , is less than the maximum stretching load  $L_s$ , the blank is free to draw completely through the die and the depth of draw is limited by the blank size. However, once the maxi-

Fig. 1 — Two similarly-shaped parts formed under grossly different drawing conditions. (The degree of deformation of the metal is indicated by the darkness of the shaded portion of the blank.)





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imum drawing load,  $L_d$ , is greater than the maximum stretching load,  $L_s$ , the blank will tend to neck in the stretching region before more than about  $\frac{1}{3}$  to  $\frac{1}{2}$  of the contribution of die drawing can be realized.

Thus the maximum depth of draw obtainable decreases sharply for a given material when  $L_d/L_s$  becomes greater than 1. This is illustrated in Figure 4. In this figure the relative contribution of punch stretching and die drawing are shown schematically for various ratios of the maximum drawing load to the maximum stretching load. This, therefore, defines graphically the forming limit of any deep-drawing operation.

Now the ratio  $L_d$  to  $L_s$  is a characteristic of each drawing operation. Its value may be altered by tool design, blank size and shape, lubricating techniques, and press operation. It is relatively un-

affected by the properties of the material being drawn. Thus a deep-drawing operation can be represented on Figure 4 by a single point, the location of which is determined by the depth of draw involved and the characteristic  $L_d/L_s$  ratio of the drawing operation.

On the other hand, the values of  $D_s$  and  $D_d$  are functions of the properties of the material being drawn. The line in Figure 4, defining the maximum depth of draw, represents the drawability of a given material. If a point representing a particular operation falls below this line, a successful draw will result. If the point falls above this line failure will occur if  $L_d/L_s$  is greater than 1, and the blanks will pull through the die but will not have the required depth if  $L_d/L_s$  is less than 1.

Thus, three factors which determine the success of a drawing operation are:

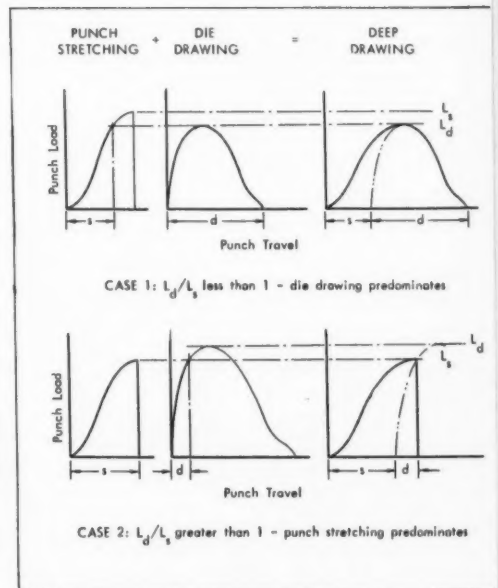


Fig. 2 — Schematic representations of an ideal punch stretching and an ideal die drawing operation. In each case, deformation only occurs in the shaded portion of the blank. Punch load-travel diagrams consistent with each ideal case are also shown.

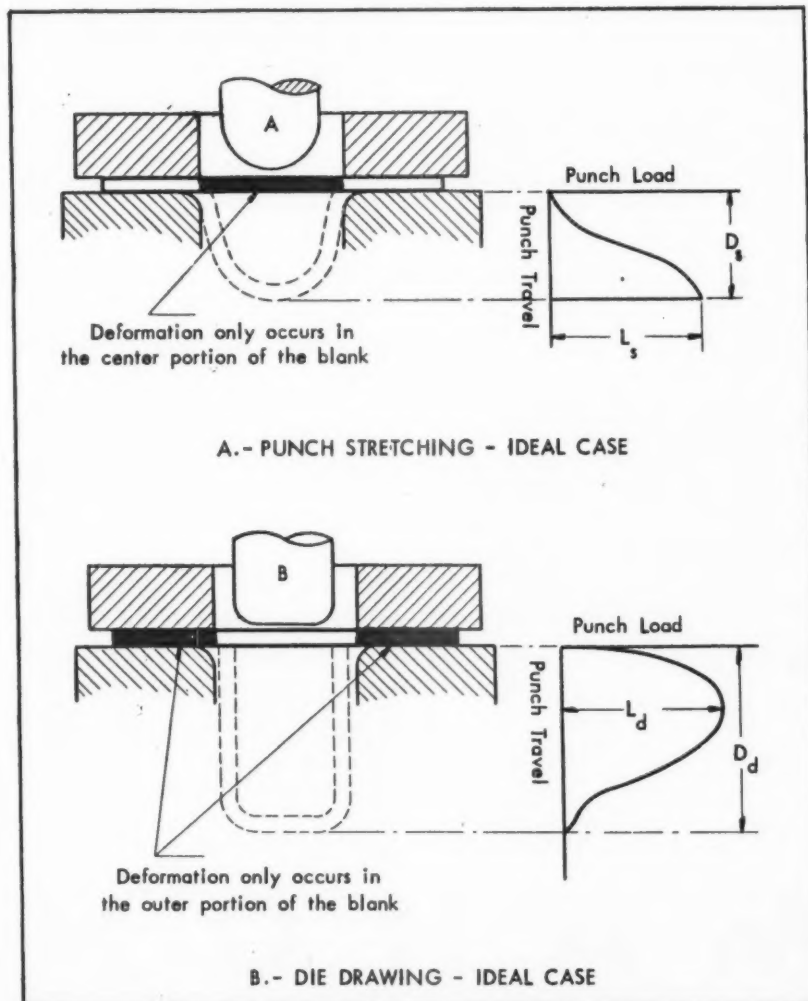


Fig. 3 — Illustration of the manner in which punch stretching and die drawing may be combined in different deep drawing operations. The predominate mode of deformation and the maximum depth of draw are determined by the relative values of the maximum die drawing load and maximum punch stretching load.

1. The total depth of draw.
2. The character of the drawing operation (defined by the  $L_d/L_s$  ratio).
3. The drawability of the material (defined by the values of  $D_s$  and  $D_d$ ).

The total depth of draw of a particular deep drawing operation is usually fixed by the shape of the part being drawn. That is to say, the designing engineer has fixed the shape, and little can be done to change draw depth when it is time to make the part in the press shop.

On the other hand, the fabricator can do much to change the character of the draw, so we will examine this in more detail. The aim of the fabricator should be to develop the most favorable combination of drawing and stretching. To establish this condition, the fabricator usually "tries out" the dies on stock representative of the steel which he intends to use. The proper combination of drawing and stretching is obtained by changing the size and shape of the blank, the hold-down pressures, lubrication, the shape and position of draw beads, etc. In making these changes the fabricator is essentially adjusting the  $L_d/L_s$  ratio.

The problem of tool development is summarized in Figure 5. If the value of  $L_d/L_s$  is greater than 1, as illustrated by the point C, then only shallow or

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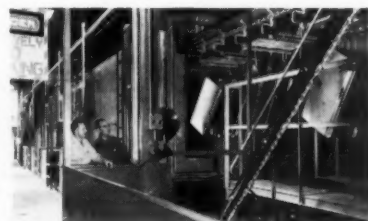
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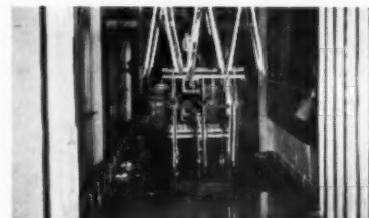
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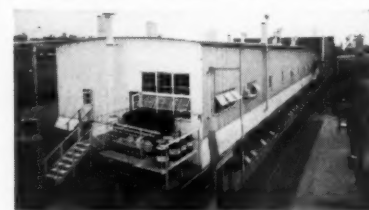
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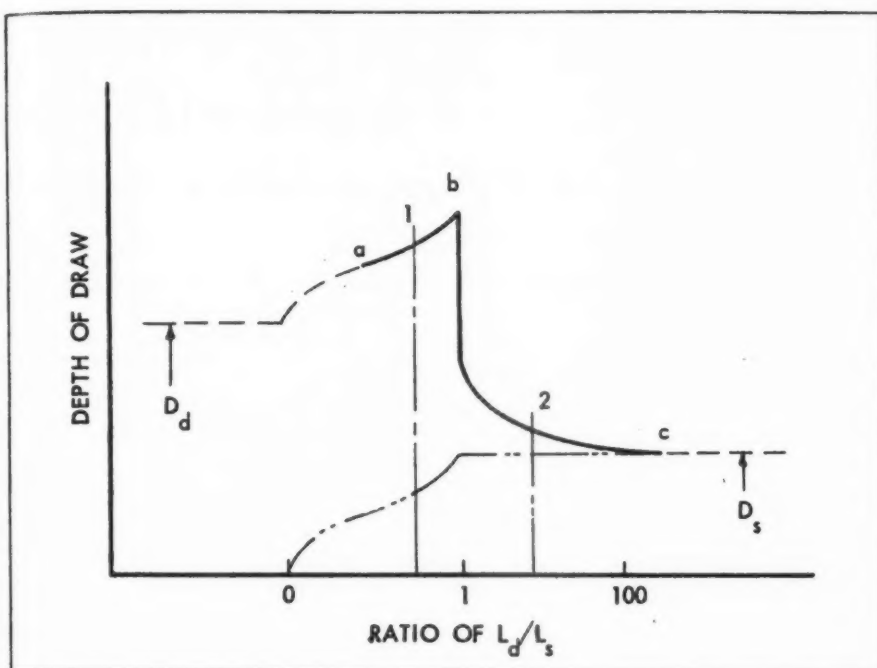


Fig. 4 — A graphical representation of the limits of the deep drawing process. Line abc defines the maximum depth of draw for a given  $L_d/L_s$  ratio. Lines 1 and 2 designate the two cases described in Fig 3.

moderate draws can be made. On the other hand, if the value of  $L_d/L_s$  is made too small there is a tendency for the blank to buckle, and to pull completely through the die.

In Figure 5, the success of the operation indicated by (a) and (c) is likely to be sensitive to changes in drawability of the steel — slight decreases in drawability putting the points above the line in the area where unsuccessful draws occur. The drawing operation represented by the point (b), however, would be quite insensitive to the drawability of the steel, but slight changes in the operation, which would shift the  $L_d/L_s$  ratio, could quickly cause trouble.

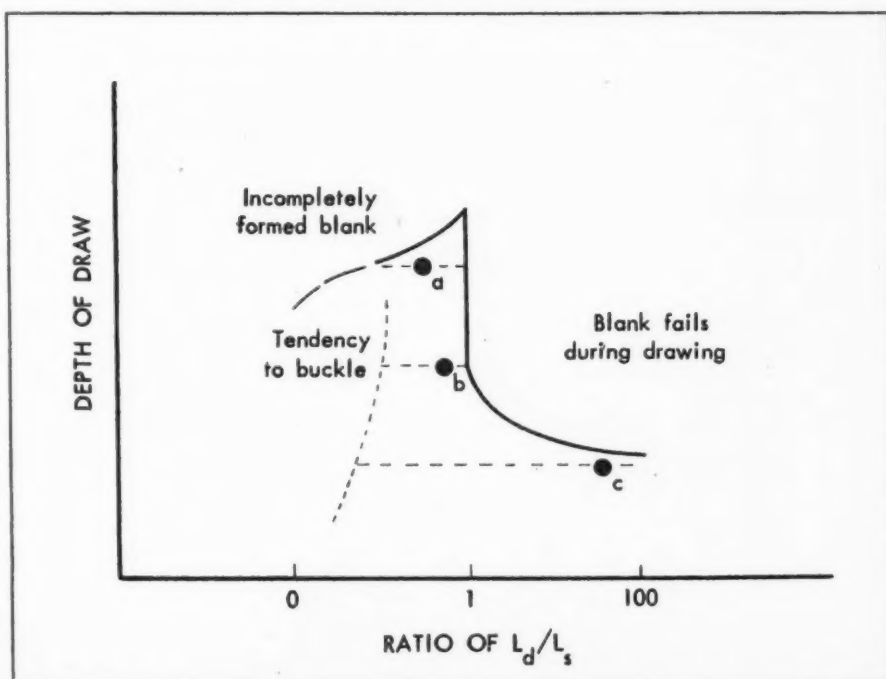
Regarding the third of the factors affecting the success of a drawing operation — the drawability of the material — it should be evident that the drawability of a metal does not correspond to some particular depth of draw. Indeed, the same material might give 100 per cent OK performance on a draw of a given depth, and 100 per cent breakage on another draw of identical depth depending on the character of the draw. Just as depth-of-draw is not a wholly satisfactory criteria for the "drawability" of a lot of steel, neither are any of the frequently-used parameters, such as hardness, ductility, yield strength, total elongation in a tensile test, etc. Thus "drawability" is an elusive thing

to measure. Therefore, it is difficult to study and to improve the drawability of steel. Nevertheless, most steel companies are actively studying sheet-steel draw-

ability. Some of the studies have been aimed at determining factors which would affect the maximum depth of draw in stretching,  $D_s$ , and the maximum depth of draw in die drawing,  $D_d$ . It has been fairly well established that the value of  $D_s$  can be related to the uniform elongation of the steel in a simple tensile test. More recently it has been suggested by work in our own laboratory that  $D_d$  is related to anisotropy. Crudely, it appears that we would like to have properties such that the metal would resist thinning — i.e., resist deformation in the thickness direction while at the same time deforming easily in the plane of the sheet. Such parameters as uniform elongation and anisotropy may eventually be controlled to give improved drawability. However, such improvements are not likely to change the basic ideas discussed here so it seems very likely that fabricators will have to continue adjusting blank size, hold down pressures, lubrication, etc. in order to make deep draws.

Adapted for MPM from a paper by the three authors and presented by Mr. Frame before the PEI 22nd Annual Shop Practice Forum. The authors are with Bethlehem Steel Co., Inc., Bethlehem, Pa.

Fig. 5 — Points a, b and c locate the coordinates of three different drawing operations. The vertical coordinate is determined by the depth of draw required by the design of the part. The horizontal coordinate,  $L_d/L_s$ , is determined by the fabricator's tool and blank development.



**M**AJOR PRODUCT LINES in the world-wide appliance picture are household washers, domestic refrigerators and television receivers. In terms of annual units sold throughout the free world, they rank in the same order, from smallest to largest.

Annual free world sales of these appliances, on the basis of 1959 statistics and estimated 1960 figures, are running approximately as follows: 9 million washers; 11 million refrigerators; and 16.7 million television receivers.

It is interesting to note from the accompanying charts that as world consumption of these appliances has increased through the years, America's share of this market through exports has dropped considerably.

#### Why the lag?

The basic reason for this, I believe, is the differences between our customs and standard of living and the customs and standard of living of other countries. The typical European refrigerator, having a capacity of 3 to 4 cu ft and selling for the equivalent of \$100 or less, could never suit an American family. However, the unit is entirely satisfactory for a German, French or British family. This is a typically European product, developed by European designers, manufactured by European producers and sold to Europeans to fit their pocket-books and their habits of living.

We manufacturers in the United States cannot build a similar unit that would sell competitively on the European market. Due to the economics of the situation, this segment of the export market is not available to American manufacturers. One can only participate in it by producing locally alongside and in competition with the European producers.

The same problem is faced by those who wish to export domestic washers, which make up 99 percent of the overseas market for home laundry equipment. Factors which work against us in this area are the size of our washers, their relatively high cost and, possibly, too many automatic features.

Production of washers in Britain, Germany, France and Japan has increased rapidly since 1950. However, most of these washers are of a 4 to 6-lb capacity, much smaller than the American family would find satisfactory. Thus, the same conditions which limit our export of refrigerators also come into play when we try to compete with foreign manufacturers of washers. A combination of shipping costs, customs duties and other cost factors make competition with efficient manufacturers abroad very difficult.

#### Market saturation low

The market saturation for these appliances in foreign countries is still low. But these markets are virtually closed to American exports by the economics involved, so that the only practical manner in which to participate in this substantial market is local manufacture of washers and refrigerators in the sizes and with the features that local families desire and will purchase.

The competition provided by European and Japanese manufacturers in the export of washers is demonstrated in the following tabulation:

<i>Exports of Washing Machines in Units</i>		
	1954	1959
Britain	223,000	140,000
Germany	70,000	200,000
France	13,000	55,000
Holland	15,000	83,000
Belgium	16,000	11,000
Italy	none	8,000
Japan	none	15,000
Total	337,000	512,000

Keeping in mind that the United States exported 94,000 washers in 1954 and 117,000 washers in 1959, it is interesting to note that the total export of washers from the seven other countries in 1954 was approximately three and one-half times our own exports in that year. But five years later, the washer exports of these seven countries were almost five times our own, despite the fact that our exports were 20 percent higher in 1959 than in 1954.

In the future, it appears that American washing machine manufacturers will continue to export about two percent of their annual domestic sales, and that refrigerator manufacturers' exports will remain at approximately five percent.

Reversing the situation, it seems unlikely that washers built abroad will find a market in the United States, because they operate on unfamiliar principles and have smaller capacities than we seem to desire.

The small European table-top refriger-

## A world-wide view of the appliance market

BY *James M. Skinner, Jr.*, PRESIDENT, PHILCO CORP.

ators, however, may find a modest market in the United States as a "second" refrigerator.

#### Growing market abroad

Appliance markets abroad should continue to grow throughout the 1960's, often at annual rates of increase from two to four times that which we can expect in the United States. Whereas the replacement of old and worn out units, the formation of new families and the construction of new dwelling units should result in an average annual appliance market increase of less than five percent in this country, the sales curves in a number of countries are just beginning to turn upward. This upward curve historically represents the few years of most rapid expansion which is followed by the levelling off and slower rate of annual increase which we are experiencing now.

One of the characteristics of the rapidly expanding appliance market overseas is a continuous and increasing demand for new sources of capital. Most of these companies are not able to turn their capital over as quickly as we do in the United States. Component suppliers are not as plentiful, and those that do exist are not as flexible, as large or as experienced as the suppliers to the industry here.

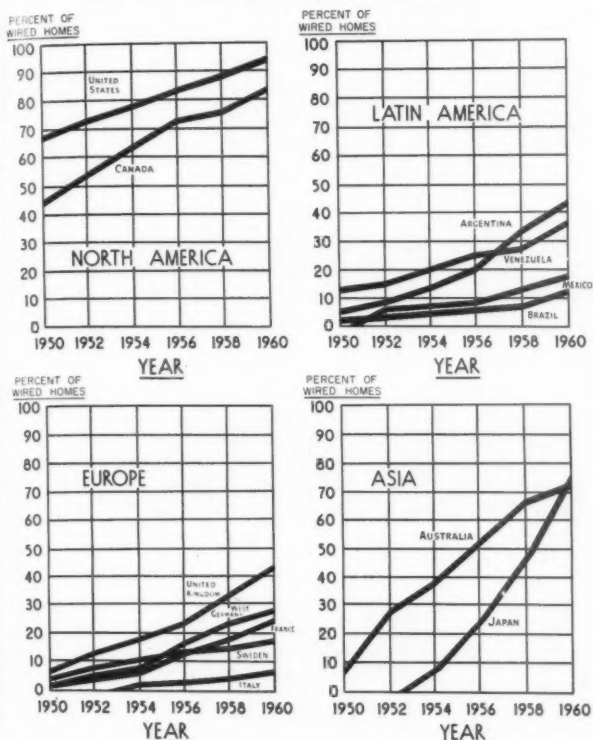
As a result, the overseas companies must plan further ahead of their markets. Also, they often produce more components themselves. To insure against delays and interruptions in production schedules, they often keep their inventories at higher levels, relative to sales, than we do in the United States.

#### Substantial profits

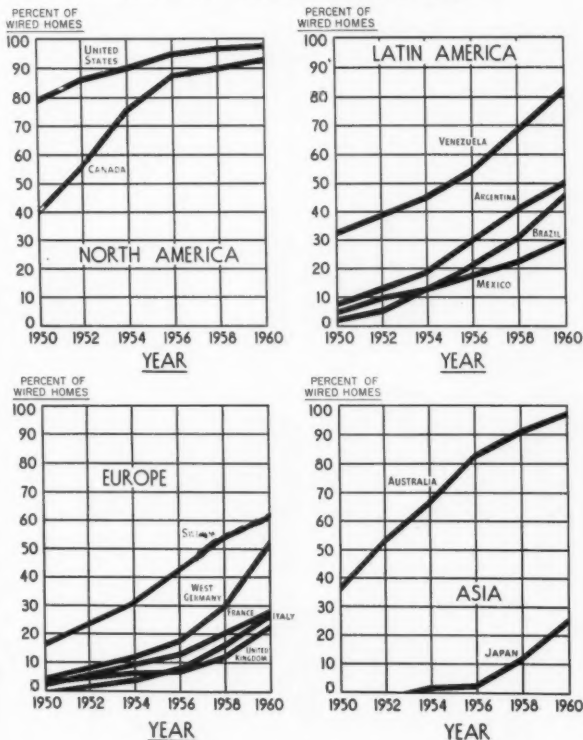
Despite these circumstances, plus credit facilities for consumer and dealer financing which are often inadequate, the larger and well-run companies earn substantial profits. This is expected in markets where consumer demand takes up annual production, and production volume, production efficiencies and sales increase annually.

TO PAGE 103—>

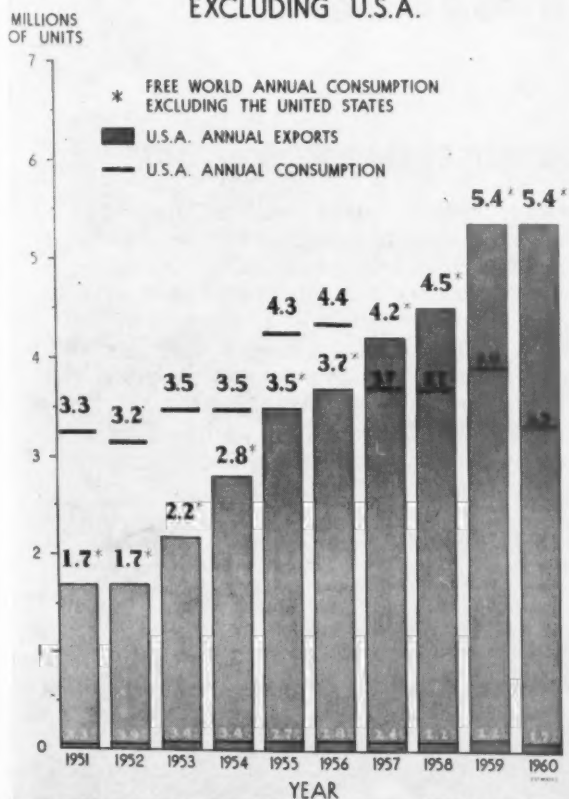
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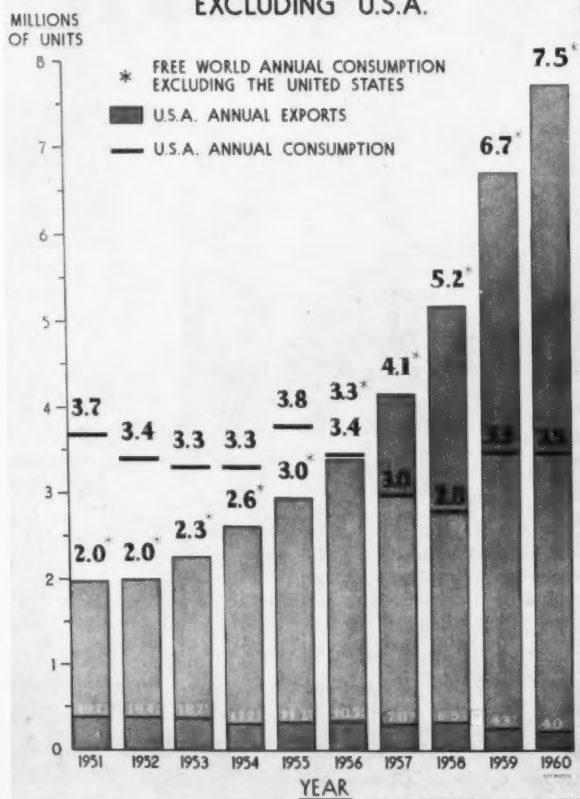
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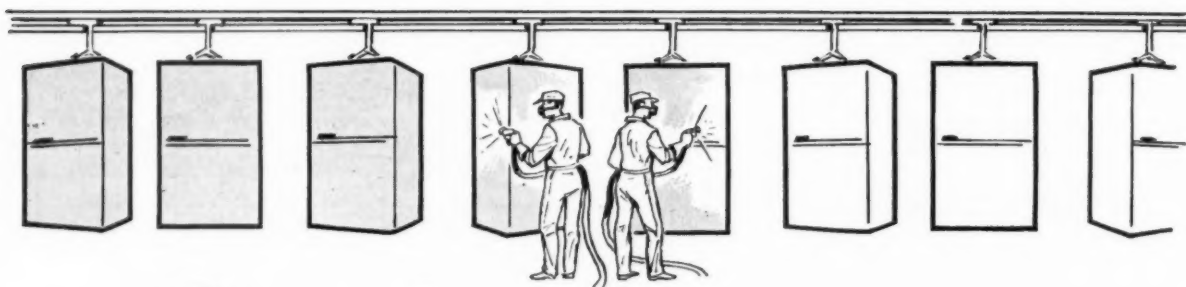


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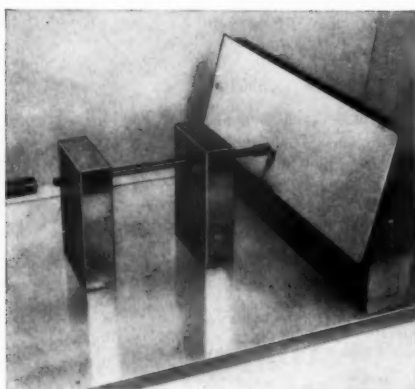


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With its high solids content, Du Pont "Dulux" assures smooth, high build, even on sharp edges. Result: greater line efficiency—fewer rejects. Leading appliance manufacturers count on "Dulux" for consistently fast, trouble-free operation, whether applied by hot spray, steam spray...or electrostatically. ■ And "Dulux" adds sales appeal, too. It keeps its lustrous good looks . . . resists staining, grease and is easy to clean. Year after year, this rugged finish stands up under rough treatment without chipping or cracking. ■ Get all the facts about "Dulux" Enamel from your Du Pont Representative, or write: E. I. du Pont de Nemours & Co. (Inc.), 2500 Nemours Building, Wilmington 98, Delaware.

## DU PONT INDUSTRIAL FINISHES



BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

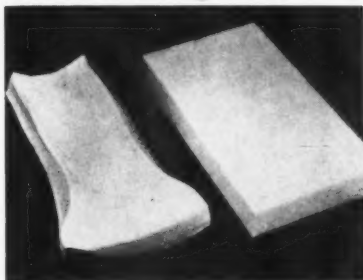
Circle No. 315 on Reader Service Card.

# MPM

## new supplies and equipment

For further information on  
New Supplies and Equipment,  
use Reader Service Card  
on pages 95 & 96.

### Urethane Insulating Foam



A urethane insulating foam, providing dimensional stability at sub-zero temperatures in a low-density formulation, has been developed by the Plastics Div., Nopco Chemical Co.

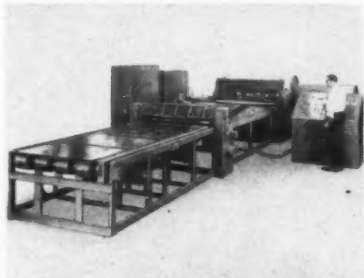
Designated Nopco Lockfoam H-602, the formulation is expected to open the way for expanded use in insulating refrigerators, freezers, frozen food lockers, trailers and railroad cars.

The foam is said to provide excellent structural strength and dimensional stability, and exhibits a K-factor of 0.13.

A pour-in-place rigid foam formulation, H-602 eliminates the collapse of cell walls at and below zero degrees.

Circle No. 201 on Reader Service Card.

### Decoiling And Cut-To-Length Line



An automatic decoiling and cut-to-length line, manufactured by Lennox Tool & Machine Builders, has been designed to provide highly accurate cut lengths at a low initial cost.

The line consists of a coil reel, a straightener or leveler/measuring unit, a hump table, a shear and a conveyor unit. Various capacity lines are available, with a maximum sheet thickness of 3/16 in. and 72 in. in width. Cut length accuracy of plus or minus .008 in. can be provided depending on customers' requirements.

Optional equipment, such as coil ramp, coil lift, peeler (for heavier gage materials), tracking device, edge trimmer, scrap chopper and stacking unit is available.

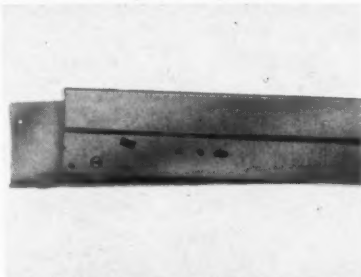
Circle No. 202 on Reader Service Card.

### Buffed Stainless Steel Strip

Universal-Cyclops Steel Corp. announces the commercial availability of stainless steel strip with a highly reflective finish called Unibrite. The finish is a result of production line buffing at the producing mill. An in-line buffing operation on both sides of the strip has been perfected by the firm to produce the brighter, more corrosion-resistant stainless demanded by appliance, housewares and automobile manufacturers.

Circle No. 203 on Reader Service Card.

### Automatically-Closing Slide

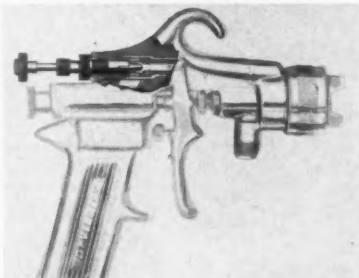


The No. 340 Auto-Slide, manufactured by Grant Pulley & Hardware Corp., requires only the slightest push for it to slide by itself into a closed position. The Auto-Slide is recommended for application to refrigerators, washing machines, dishwashers, ranges and other appliances which require the accessibility of certain units. It is available from stock in any length from 14 in. to 28 in. The slide can also be adapted to suit specific length requirements. The unit requires but 1/2 in. of side space and its load capacity is rated at 100 lbs.

The No. 340 has a bright zinc finish, but can be plated to suit individual requirements.

Circle No. 204 on Reader Service Card.

### Push-Pull Device For Spray Guns



A push-pull device, enabling an instant change from a broad spray pattern to a narrow one, is available from The DeVilbiss Co. for use with the firm's P-MBC or MBC hand spray guns. Pushed in, the unit switches the spray from a broad to a narrow pattern. Pulled out, the broad fan spray pattern is restored, all without losing the original pattern setting.

A spray painter working on large flat areas can instantly switch to a narrow pattern to extend the length of the spray for otherwise out-of-reach areas or for coating pipes, wainscoting or other items better done with a narrow pattern. This cuts down needless overspray, saves cleanup time, and eliminates stops to readjust the gun.

Circle No. 205 on Reader Service Card.

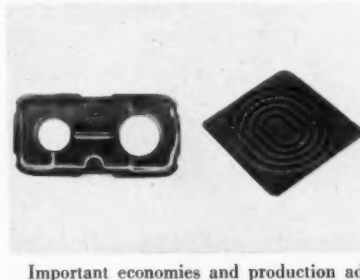
### Articulated "C" Hook

A double-arm articulated "C" hook introduced by Cullen-Friedstedt Co. allows a crane operator to give maximum service to a continuous coil line by picking off two coils at a time, yet permits the operator to handle or set down a single coil to fill all available floor space.

The articulated design of the double hook unit permits the arm to elevate upward out of the way when only one coil is lifted.

Circle No. 206 on Reader Service Card.

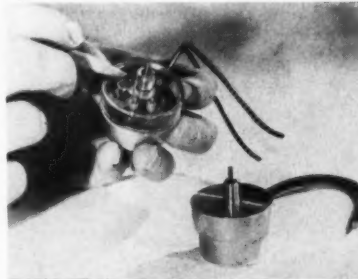
### Pre-Finished ChromSteel



Important economies and production advantages over conventional piece plating methods in the fabrication of low cost metal items and large surface areas of appliances can be gained by the use of pre-finished ChromSteel, a product of Apollo Metals, Inc. The use of ChromSteel is said to reduce inventory and conserve space, as it is not necessary to stockpile stamped parts at the head of the plating line or plated parts in the finishing plant as safeguards against interrupted production. Pre-finished metal is readily available and can be ordered only as needed. ChromSteel also minimizes handling time as it arrives cut to size and ready to use.

Circle No. 207 on Reader Service Card.

### Synchronous Timer Motor



A new concept in synchronous timer motor design featuring a new method of sealing all moving parts in oil to achieve noiseless and virtual lifetime continuous operations has been developed by Lake City, Inc., a subsidiary of Controls Co. of America.

Complete sealing is effected by a specially designed spring-loaded packing gland which prevents the oil from working out of the housing when the motor is operating. Key element of the packing gland is a neoprene "O" ring which is held under constant spring pressure and sealing the oil.

The motor is expected to have applications in home appliances, computers, office equipment, etc.

Circle No. 208 on Reader Service Card.

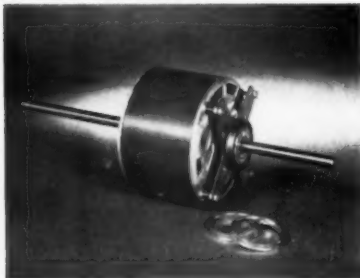
TO NEXT PAGE →

### Bright Dip For Cadmium

Allied Research Products, Inc. has introduced a liquid bright dip for cadmium, designated Iridite 4L01. It is a single dip which will produce a bright, clear finish on cadmium barrel plated work or rack plated work. The dip is said to be easy rinsing and will stand transfer times of 30 to 40 seconds without cloudiness or staining.

Circle No. 209 on Reader Service Card.

### Replacement Motor

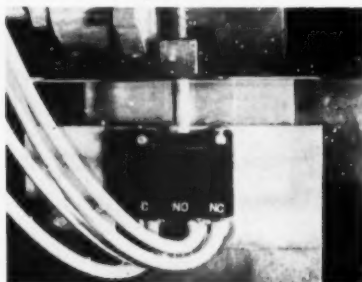


Mounting dimensions can now be varied up to one full inch with an adjustable mounting adapter on the permanent-split capacitor and shaded pole replacement motor line introduced by the General Electric Co. Varying the mounting dimensions means that the 24 models in the new line can replace almost every 5½-in.-diameter fan motor used in room air conditioners and many on furnace blowers, according to company engineers.

Twenty-five in. leads are standard on all models, as are extra long double shaft extensions with maximum-length flats. Gun-metal-like finish on the shafts helps protect against corrosion.

Circle No. 210 on Reader Service Card.

### Precision Snap-Action Switch



A low-cost, waterproof precision snap-action limit switch capable of underwater operation without leakage has been developed by Controls Co. of America. Designed for a variety of home appliance, automotive and industrial applications, the limit switch is especially suited for automatic dishwashers, food processing, bottling, refrigeration, and many other manufacturing or processing operations involving washing, steaming or highly-humid environments.

The switch is engineered for a minimum life capacity of 1 million cycles and has been actuated 200,000 times with full over-travel under a one-inch head of water without leaking.

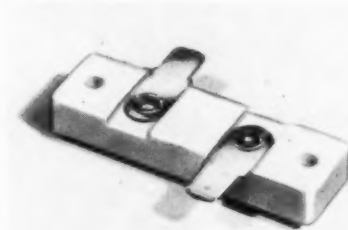
Circle No. 211 on Reader Service Card.

### Double-Duty Welder

An engine-driven dc welder that also serves as an ac power plant is offered by Harnischfeger Corp. Rated at 200 amps, 50-percent duty cycle, the unit delivers 3½ kw, 120 volts ac, 60-cycle current for lighting and electric tools. Power is supplied by a two-cylinder, four-cycle air-cooled gasoline engine of 12.8 hp at 600 rpm, complete with 12-volt electric starter.

Circle No. 212 on Reader Service Card.

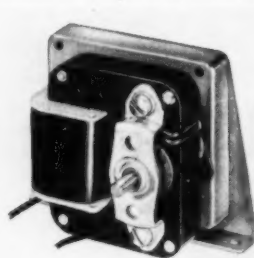
### Bi-Metal Thermostat



A low cost bi-metal thermostat, Model MS, has been introduced by American Thermostat Corp. Designed to act as a thermal safety switch, the unit is particularly suited for use in hot trays, warmers, and in the control of forced hot air in products such as hair dryers. Compactly built, it is a fixed setting thermostat with single pole, single wire controls, and the contacts open with a rise in temperature. The useful operating range is from 70 to 600 F. At the time the thermostat is installed in the appliance, an adjusting set screw permits trimming the calibration to close limits. The unit has a ceramic body, push-on lugs and silver contacts.

Circle No. 213 on Reader Service Card.

### Fractional Horsepower Gear Motor



A fractional horsepower gear motor has recently been announced by Molon Motor & Coil Corp. Identified as Type HGM, the new motor features a magnetic clutch and silent operation. The magnetic clutch disengages the rotor pinion from remainder of the gear train when motor is de-energized to prevent coasting of output shaft. Extremely low noise level is said to be obtained in motors without clutch, through use of special nylon helical rotor pinion and first gear.

Motor specifications are: Two-pole shaded-pole, ac induction motor, available in voltages ranging from 6 to 220 volts, 50 or 60 cycle. A cooling fan is available for continuous duty applications.

Circle No. 214 on Reader Service Card.

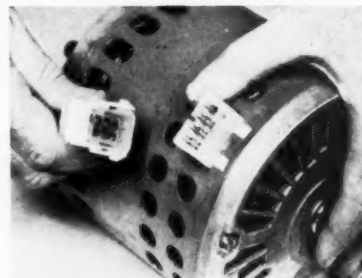
### Direct Spark Ignition System

A direct automatic spark ignition system, developed by Controls Co. of America, is designed for use in home laundry dryers, gas-fired automatic dishwashers, washer-dryer combination units, and through-the-wall-type vented heaters used in trailers and other compact dwellings.

The "Spark-Lite" is said to be simple in design and easily adapted to the appliance.

Circle No. 215 on Reader Service Card.

### Twin Lock Motor Connector



A twin lock motor connector for the appliance industry has been developed by Packard Electric Div., General Motors Corp. The device eliminates the need for any wiring harness being supplied with the appliance motor. The connector is designed to mount in a hole pierced in the motor frame. Mating halves contain identical terminals which, in themselves, make the electrical connection without relying on the nylon bodies. When connected, the bodies are mechanically locked together completely independent of the terminal. This device has been rated at 15 amperes at 125 volts. The photo illustrates the eight-terminal design.

Circle No. 216 on Reader Service Card.

### Thin Gauge Metal Welding



A welding package, available from Westinghouse Electric Corp. and called the Westing-Arc SA-200 system, includes a 200 ampere silicon diode rectifier power source, a compact wire drive system with wide feed range, and straight-through torches. The power source, a Westing-Arc RCV welder, has features that make it fitted for fine electrode wire production welding of thin-gage metals.

Circle No. 217 on Reader Service Card.

### Automatic Reset Timers

A series of automatic reset timers designed to delay an operation or to operate

TO PAGE 76, COL. 2 →

OCTOBER • 1961 MPM

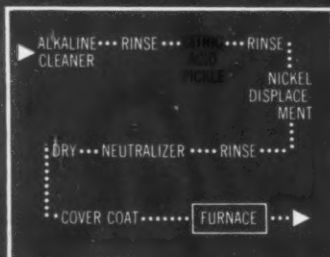


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□ Now, produce excellent, one-coat porcelain enamel finishes on metal surfaces. Your present equipment, only slightly modified, can bring you the advantages of an effective new direct-on development. □ Consider these features of the CITROBOND Process: **1.** Simply use citric acid in place of sulfuric acid in the pickling bath **2.** Dry, non-toxic, water-soluble, easy-to-handle Pfizer Citric Acid prepares the metal in a way that makes a ground coat unnecessary **3.** No major installation of special equipment is required **4.** Non-premium type steels can be used **5.** Excellent results are obtained with new low carbon steels □ Let Pfizer send you all the information about this modern enameling technique. Clip and mail the convenient coupon now.



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\* Process developed by W. G. Ray, Chas. Pfizer & Co., Inc. and Shipp C. Davis, Daco Corp.

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Circle No. 348 on Reader Service Card.

# GENERAL INDUSTRIES

# SMOOTH POWER

## AC MOTORS

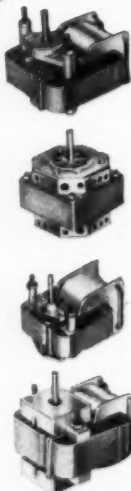
pack more power into  
less space—give dependable  
trouble-free service!



Standard Line  
AC Induction  
Motors from  
1/1800 to 1/35 H.P.

In any industry, extra care in manufacturing means an extra margin of dependability. No-where else is this "extra" so important as in the manufacture of motors — for a product is only as good as the motor that powers it.

General Industries' complete manufacturing facilities mean economy, too as well as on-time delivery. For any fractional h.p. requirement you'll always be right when you specify G.I.



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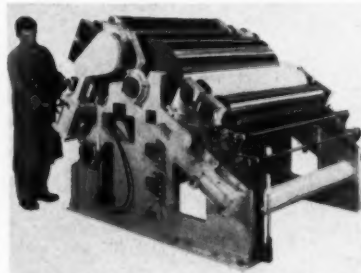
Circle No. 320 on Reader Service Card.

a circuit for a preset time after remote pilot action is available from the Paragon Electric Co. The 500 Series timers are particularly suited for motor control, electric equipment delay, heating and air conditioning applications, for vending machines, machine tools, in-process control or other applications where time delay and automatic reset is required.

Three types are offered: Type 500, 501 and 502, each of which are available with a time range of one, three or five minutes, and one hour or five hours, adjustable within the range. Complete information is provided in Bulletin No. 6126.

Circle No. 218 on Reader Service Card.

### Coating, Laminating Equipment

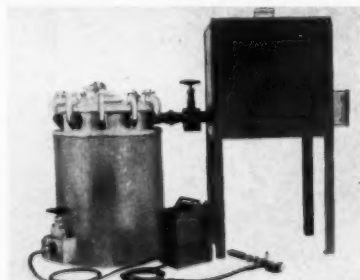


A line of heavy-duty roller coating and laminating equipment capable of running steel or aluminum strip up to 16 gage in thickness has been announced by Faustel Inc. Available in widths up to 48 in., the complete line includes both 2 and 3-roll coaters in addition to laminator/embossers for thermoplastics.

The 2-roll or prime coater is capable of both direct (straight) or reverse roller coating for either top or bottom side application. Each of the seven rollers operate through an individual variable speed synchronous motor drive with its own frequency regulator. As optional equipment, the company offers individual pneumatic throwoffs with positive return for all rollers.

Circle No. 219 on Reader Service Card.

### Assemblies for Spraying, Flowing



Electrically heated, multiple unit low pressure assemblies for spraying and flowing applications are manufactured to users' specifications by StaWarm Electric Co. Suitable for spraying or flowing of many different industrial compounds such as waxes, asphaltic compounds, resins and sealants, multiple unit low pressure assemblies are used in the manufacture of insulating materials, shingles, fiber cans and paper coating processes.

Consisting of one or two premelters, low pressure tank, valves, piping systems, or

The frit that was good enough ten years ago may not be usable today. New products and processes have demanded new frits . . . and will demand still more. APEC has increased its product research and service staff, time and again, to meet these growing technological needs. A full sized, full time technical staff works constantly improving old products, creating new ones to customer's specification, and finding new cost saving services and methods for our customers. APEC has the products and complete service you

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## TIMES HAVE CHANGED



...and APEC is changing  
with the times



**american porcelain  
enamel company**

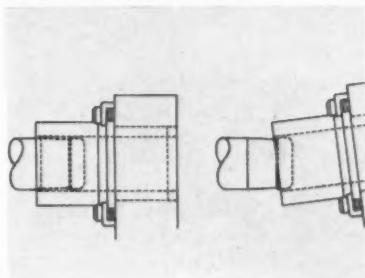
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Circle No. 303 on Reader Service Card.

manifold and hoses, these assemblies are particularly adaptable where there is a need for flowing or spraying a highly viscous material.

Circle No. 220 on Reader Service Card.

#### Guide Post For Die Sets



A guide post with a relieved pilot section designed for extra ease in assembling and disassembling die sets has been introduced by Danly Machine Specialties, Inc. The pilot guide post has a pilot section just below the top of the post which consists of a narrow band followed by a tapered undercut and which, according to the firm, is accurately ground for maximum ease of assembly and minimum loss of guide.

In assembling a die set, the post assures easy alignment even when the punch holder is not placed squarely on the post. As the punch holder is placed in position, the bushing hesitates on the pilot section and, with a pivot action, the bushing comes into alignment with the post.

Circle No. 221 on Reader Service Card.

#### Extruded Aluminum Slide



Grant Pulley & Hardware Corp. has announced the availability of a new Micro-Slide. A three-section, extruded aluminum slide, it is said to be the smallest, thinnest ball bearing slide made for standard or miniature equipment. Its size characteristics (5/16 in. thick by 1 5/8 in. high) is the slide's most unique feature, enabling it to be used even under space restrictive conditions of extreme type.

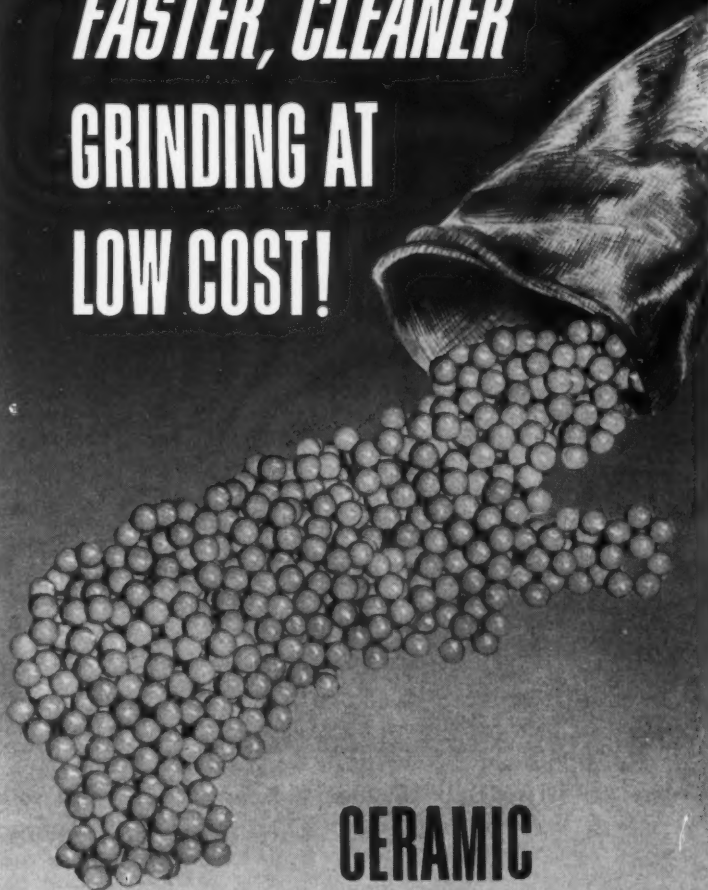
Circle No. 222 on Reader Service Card.

#### Primers For Plastics

Development of two specialized primers for fusing vinyl plastisols to metallic and non-metallic surfaces has been announced by Dennis Chemical Co. Denflex No. 2394-1 White Primer bonds plastisols to metal to form coatings which are said to withstand immersion in cold or boiling water and exposures to conditions of high humidity.

MPM OCTOBER • 1961

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Fast grinding, long wearing porcelain. Carefully fired. Fully vitrified. Impervious. Uniform particle structure. 1/2" to 3" diameters.

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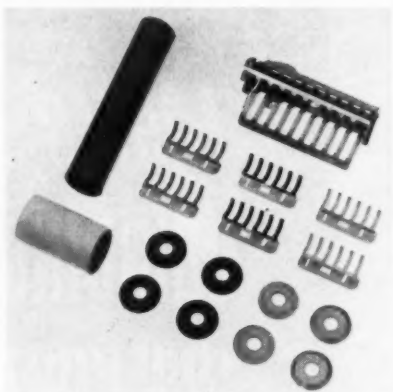


## New "extra hard" porcelain enamel for aluminum

A NEW PORCELAIN ENAMEL coating for aluminum has been announced by American Lava Corp., Chattanooga, Tenn., wholly owned subsidiary of Minnesota Mining and Mfg. Co. The new "harder than glass" enamel is reported to have a hardness of 6.75 on the Mohs scale, and to show an abrasion resistance up to 17 times that of "standard" porcelains for aluminum when compared by the Taber abrasion test. Controlled surface finishes from "6 to 60 micro-in., rms," are included in the development.

Textile industry applications have served as a proving ground for the new "3M" brand of porcelain enamel. American Lava reports that in these applications porcelain enamel lasted 11 times longer than chrome plated steel shoes and showed no signs of wear after 6½ months of constant production use on tension fingers which are subject to highly-abrasive synthetic fiber. The chrome plated fingers required replacement every 30 days.

The new coating will be offered where there is an abrasion, acid and solvent resistant requirement for aluminum parts. It is expected to find a place on large surfaces which may be unobtain-



Abrasive protection for aluminum thread guide items can now be provided with porcelain enamel. Sleeves for heated draw pins, tension discs, fingers and gates, used in production of synthetic fibers, are shown with various colors and surface finishes.

able in "ceramic" form because of size. The porcelain enamel can be made in a variety of colors to meet specific requirements.

Additional information on 3M brand porcelain enamel may be obtained from the American Lava Corp., Titania Div., Chattanooga 5, Tenn.

Circle No. 150 on Reader Service Card.

## Tentative standard for spall resistance testing of porcelain enameled aluminum

Sponsored by ASTM Committee C-22

AT THE ANNUAL MEETING of the American Society for Testing Materials, a new test sponsored by ASTM Committee C-22 on Porcelain Enamel was tentatively accepted for publication. This is the Method of Test for Spalling Resistance of Porcelain Enameled Aluminum, ASTM designation C 486-61T.

Samuel F. Etris, assistant technical secretary for ASTM, describes the test as an extremely important one, "since experience has shown that porcelain enameled aluminum that fails under test will probably spall in service if subjected to moisture or weather."

The committee has found that there have been no authenticated cases where properly tested specimens have passed the spall test and subsequently spalled in service. The test consists of immersing the porcelain enameled aluminum specimen completely in a freshly prepared

five percent ammonium chloride solution at room temperature. Visual inspections are made after 24 and 96 hours of immersion.

On flat or nondeformed areas any of the following types of spall that develop within 96 hours shall constitute failure: any spall area (revealing bare metal) extending 1/8-in. or more in from an edge or radius and more than one inch in length; any spall area on the interior surface (not touching an edge) that is more than 1/8-in. in its maximum dimension; and more than six visible spall spots per single foot on the interior surface.

While spalling on bent or scored areas may be somewhat inconsistent, this rating is very useful for studying processing variables. In this case the evaluation is based on the difference in the amounts of spalling after 24 hours between the experimental and control samples.

*EDITOR'S Note: Individual copies of the test method information may be purchased directly from ASTM at 30¢ each.*

## PRESSTIME NEWS

### Ford To Purchase Philco

Ford Motor Co. is planning to enter the appliance, radio-TV and electronics field by purchasing Philco Corp., according to a report received shortly before this issue of MPM went to press.

The agreement, which is subject to approval by stockholders, would give one share of Ford common stock for each 4½ shares of Philco common.

### Frigidaire Recalls 350 Workers

Frigidaire has announced the recall of 350 employees to its Dayton facilities. According to Herman F. Lehman, Frigidaire general manager, the action brings the number of employees recalled in the past two months to 680, and increases employment in the division to more than 15,000, which is several hundred more than a year ago.

### Eureka Increases Work Force

An increase of almost ten percent in its permanent work force has been announced by Eureka Williams Co.

Eureka President H. T. Allenberg attributed the personnel increase to a backlog of orders on a recently introduced vacuum cleaner, an anticipated additional workload expected to result from a new vacuum cleaner just introduced, and an increase in government contract work.

### Vending Machine Firm Sold

The inventory and other assets of the vending machine operations of United States Chemical Milling Corp. have been purchased by United States Automatic Merchandising Co. USAMCO issued 75,000 shares of its common stock to USCM in exchange for the vending machine assets.

USAMCO, with headquarters in Compton, Calif., is active in the sale, financing and operation of vending machines.

### Manitowoc to Do Subcontracting

An expansion of facilities to allow subcontracting work has been announced by Manitowoc Equipment Works, Manitowoc, Wis. The company has formed a new Specialty Products Div., headed by Kenneth R. Strouf, former supervisor of the firm's time study department.

The company currently manufactures home freezers and refrigerators, display counters for dairy foods, frozen foods and ice cream, and does contract metal stamping and fabricating.



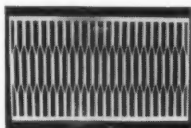
*Some plain talk about refrigerators and cost-cutting:*

## RUST RUINS REPUTATIONS!

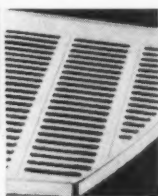
**There's no substitute for refrigerator shelves of ALUMINUM.  
Don't risk use of other materials to save a few cents per box  
when the consequences can be a damaged reputation.**

### Short Cut to Brand Oblivion

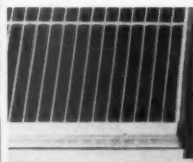
A rusty refrigerator shelf puts the skids under a brand name quicker than anything . . . unless it's a shelf that warps, chips, or cracks. But this is the risk when you replace quality ALUMINUM shelves. The few pennies you save per refrigerator can be the costliest savings ever when you evaluate the long term damage to your reputation . . . and sales!



Expanded Extrusion



Formed Sheet



Wire



## REYNOLDS ALUMINUM

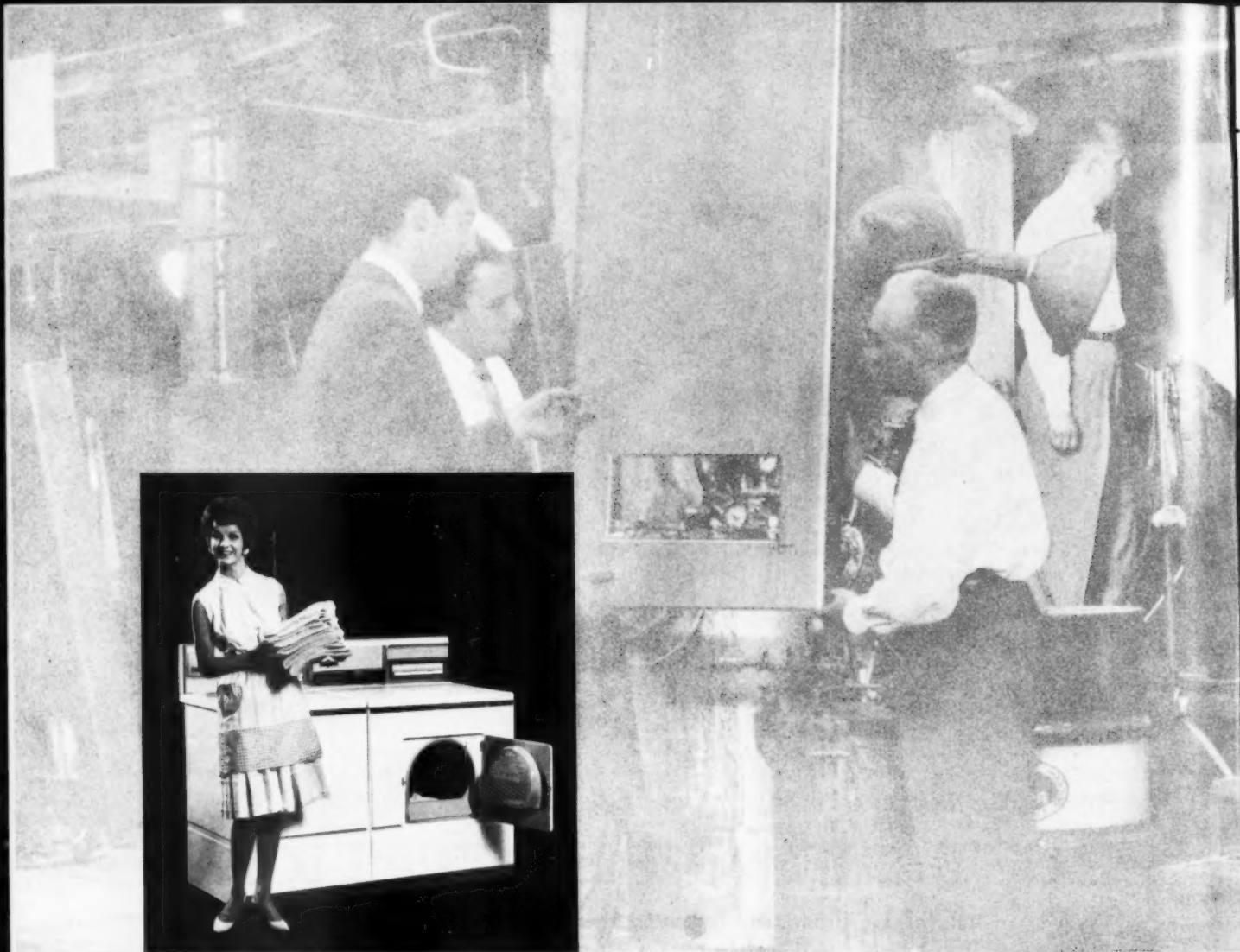
Watch Reynolds exciting TV programs on NBC: the Dick Powell Reynolds Aluminum Show every other Tuesday; **Say When** weekdays; and **All Star Golf**—in living color—every Saturday.

Circle No. 353 on Reader Service Card.

### Customers Prefer Aluminum Shelves

Consider the well known, well advertised benefits of ALUMINUM. It's rustfree and carefree, lightweight and strong, non-toxic and corrosion resistant. ALUMINUM shelves add a look of quality to refrigerators and freezers that no other material can . . . and no other material can offer you the design versatility that aluminum can.

Expanded Extrusion—Formed Sheet—Or Wire Shelves all made of customer-preferred Reynolds Aluminum. Select the one that best meets your design requirements. Or, Reynolds Aluminum Specialists can help you with your shelf design. For more information call your nearest Reynolds branch office or write Reynolds Metals Company, Box 2346-AM, Richmond 18, Virginia.



*Built on Glidden experience...*

## **FINISHES THAT HELP KEEP YOUR CUSTOMERS SATISFIED**

All too often the finish on an appliance goes sour years before the mechanism needs attention. And is a daily eyesore to the user.

By using Glidden Technical Services, you will get the right finish for the use-conditions your appliance or other metal product will meet. And your customer will get a unit that goes on looking as good as it operates... and stays good-looking years longer.

*Total reliability* of the Glidden finish is matched to product mechanical total reliability.

Glidden experience in resin technology and paint chemistry produces the just-right finish required for your product and adaptable to your equipment.

The complete line of Glidden solvent and water-reducible finishing systems includes alkyds, acrylics, epoxys... all resin types.

Bring your finishes problems to Glidden, by letter or by phone.



### **THE GLIDDEN COMPANY**

COATINGS AND RESINS DIVISION

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### Ironrite Changes Name

Shareholders of Ironrite, Inc. recently voted to change the corporate name to Dielectric Products Engineering Co., Inc.

According to the company, the action is part of a program to unify the management of the parent and subsidiary operations, and to consolidate their operations. The corporation manufactures domestic ironers at its Mt. Clemens, Mich., factory; telephone systems at the Warren Mfg. Co., Inc., a wholly owned subsidiary at Littleton, Mass.; and electronic equipment for radio-frequency transmission at its Bridgton and Raymond plants in Maine.

### Association Gets New Name

The 50-member trade association formerly known as Office Equipment Manufacturers Institute officially became Business Equipment Manufacturers Association recently, and moved its headquarters to the new Pfizer building at 235 E. 42nd St., New York.

According to Harry C. Anderson, president, the newly named association now has three separate groups: the data processing group, the office machines group, and the office equipment group.

"We . . . realized that the common name of the organization no longer represented the full scope of the highly broadened industry," Anderson said. "As a result, the name was changed to Business Equipment Manufacturers Association."

### Vending Symposium to Hear Many International Speakers

Speakers from such widely separated areas and countries as Okinawa, Great Britain, Italy, Switzerland, Iraq, France, Holland and the Scandinavian countries will attend the first International Vending Symposium to be held in Chicago on October 31.

The International Symposium and the international guests' tour to be held the following day are part of the 75th anniversary Convention and Exhibit of the National Automatic Merchandising Association. Some 8000 persons from the United States and all parts of the world are expected to attend.

International guests also will attend

the remainder of the sessions during the four-day convention. These will deal with speeches and discussion topics of vending in the United States, while the International Symposium meetings will be devoted to vending in other parts of the world.

### Husmann First-Half Sales Up

Husmann Refrigerator Co. has reported a 1.6-percent increase in sales for the first half of 1961 over a similar period last year. The sales figure for the first half of this year was \$17,586,929. Consolidated net earnings amounted to \$674,178 as compared with \$911,042 last year.

### Waste King Corp. Markets 2 Millionth Waste Disposer

Waste King Corp., Los Angeles has marketed its two millionth food waste disposer. According to the company, this is a significant indication of the 15-year growth of the disposer industry.

When the company introduced its first disposer in 1946 there were fewer than 100,000 disposers in American homes. Today there are more than 6,200,000. It is estimated that the industry sold a record 800,000 disposers last year, and Waste King President Bertram Given predicted that 875,000 will be sold in 1961.

### Dearborn Stove to Build New Plant and Offices

Dearborn Stove Co., Dallas, has let a \$1.5 million contract for construction of a new plant, warehouse and office building.

According to Dearborn President R. H. Norris, the 230,000 sq ft plant is expected to be completed by June 1962. The plant will be located in the Garland industrial district of Dallas on a 30-acre tract. Dearborn produces cooling and gas heating equipment.

Facilities in the new structure will

### Rheem Opens Packaging Lab

Rheem Mfg. Co.'s Container Div. has opened a new Research and Technical Service Center in a separate building at the division's headquarters in Linden, N. J. These operations were formerly located at the division's Chicago plant.

"Our enlarged staff and facilities at Linden will expand the company's studies of new processes and techniques for the application of interior and exterior coat-



View of one part of Rheem's new Research and Technical Service Center at Linden, N. J.

ings to the containers produced by the division," said W. S. Goodfellow, vice president and general manager.

"Basic research and evaluation of new packages will also be undertaken in the laboratory," he added.

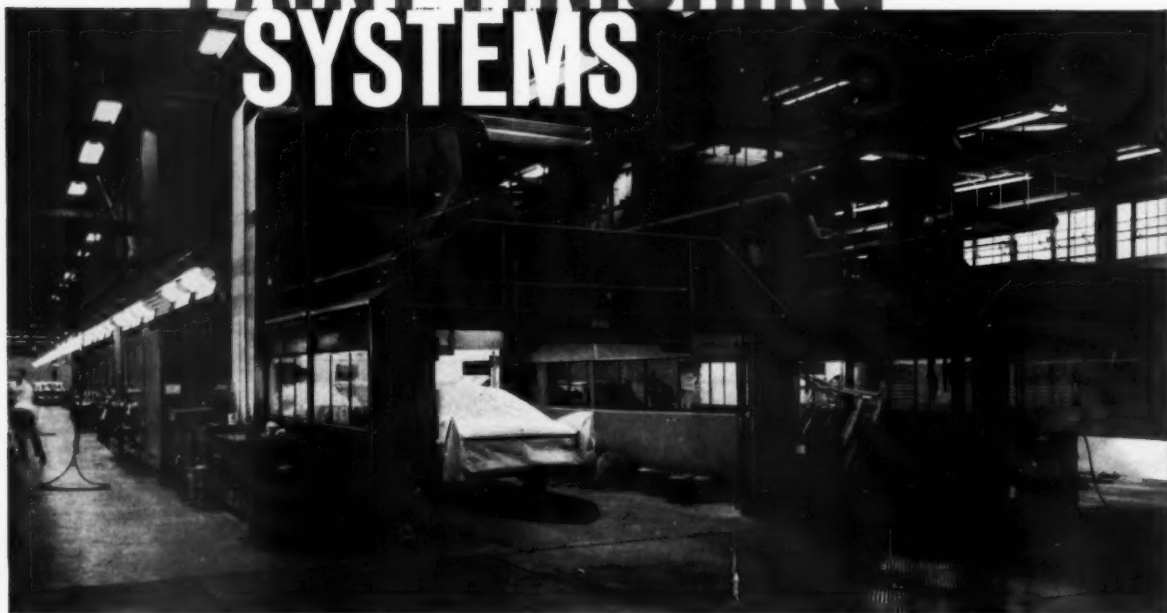
In addition to research and testing work on container linings, the research and development staff will conduct













Architect's drawing of Dearborn Stove Co.'s new 230,000 sq ft plant which will be built in Dallas' Garland industrial district.



# COMPLETE PAINT FINISHING SYSTEMS



Everything from METAL CLEANING  through  
DRY-OFF  on to FLOW COATING  into  
SOLVENT VAPOR ENCLOSURE  to FLASH OFF   
into PRIME COAT BAKE OVEN  on to FINISH  
COAT  then to FINISH COAT BAKE OVEN   
into COOL  on to INSPECTION 

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The whole system is an engineered combination of the most modern ROSS components including metal preparation units, spray booths, flow coat units, dry-off ovens, air make-up units, air heaters, conveyors and air conditioning units. Now, a single responsibility for the entire system—engineered, designed, constructed and erected by J. O. Ross Engineering. For more information send for Paint Finishing Bulletin No. PF 401.

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studies in exterior finishes and lithography to enhance container appearance and durability; test customers' new products and new formulations to determine suitable package linings for product protection during shipment and storage; and investigate the design, fabrication and utilization of new basic raw materials for construction of shipping containers of the future.

### McKay to Manufacture Wean Metal Processing Equipment

The McKay Machine Co., Youngstown, Ohio, has been licensed to manufacture lines of metal processing equipment formerly manufactured by the Wean Equipment Corp., Cleveland.

A. J. Wardle, Jr., McKay president, noted that McKay has been sales representative for Wean since February 1960, and will now be in a position to manufacture the Wean machinery as well as their own products and those of their subsidiaries.

### Vulcan-Hart Buys Ideal Cooler

Vulcan-Hart Corp. of Louisville and Baltimore has announced the purchase of the stock of Ideal Cooler Corp., St. Louis.

Ideal Cooler manufactures beverage coolers, reach-in refrigerators and freezers, and walk-in refrigerators. Vulcan-Hart builds commercial cooking equipment.

### Glidden Forms "Groups"

The four major divisions of the Glidden Co. are now known as "groups," according to an announcement by Dwight P. Joyce, chairman and president.

The four units are: The Coatings and Resins Group, headed by Paul W. Neidhart, vice president; The Durkee Famous Foods Group; The Chemicals Group; and The International Group.

### Pemco Adds Research Facilities

Pemco Corp. has announced the start of construction on an addition to its research facilities. The new building and its facilities will be devoted exclusively to the study of metals and metal surfaces for the application of porcelain enamels and ceramic coatings.

According to the company, the new structure will permit more detailed studies of steel, stainless, aluminum, and other metal surfaces. The facilities will also be used to develop coatings for application to new metals and alloys as they reach the market.

### Caloric Appliance August Sales Up 36 Per Cent

Caloric Appliance Corp.'s August sales were at record levels, up 36 per cent from August 1960, which was also a record month, according to LeRoy Klein, vice president of sales for the gas appliance manufacturing firm. The sales totals for the first eight months of 1961 were the highest for any comparable period in the company's 71-year history, Klein added.

### Cantor, Seaportel Merge

A merger of The Cantor Co. into Seaportel Metals, Inc. has been approved by directors of both companies. The surviving company will be known as Seaportel, Inc. The merger is subject to approval of stockholders of both firms.

J. A. Cantor, president and chairman of Cantor, will become president of the merged company, and Herbert N. Schwarz, president of Seaportel, will become chairman of the board.

Seaportel manufactures architectural and marine porcelain enameled products. Cantor specializes in the development of prime commercial properties for business and industry.

MORE NEWS ON PAGE 84 →

### Clad-Rex Offers Vinyl-Clad Sheet for Store Fixtures



Clad-Rex Div. of Simoniz Co. is now producing vinyl-clad sheet steel for store fixtures. The fixtures themselves, including showcases, gondolas, shelving, checkout counters and wall cases, are manufactured by M & D Store Fixtures, Inc., City of Industry, Calif. Two finishes, dark walnut and blonde mahogany, are now available.



### DEPENDABILITY OF METAL FINISH



Dear APOLLO:

What are the facts about APOLLO pre-finished metal giving improved dependability of finish?

Dear Sir:

APOLLO ChromSteel is honor made to specifications for plating thicknesses, whether specifications are for decoration only or for enduring service on a stove, range hood or bathroom cabinet. This beautifully finished metal always contains the same thicknesses of copper, nickel and chromium from one end of the sheet to the other, as covered by the specification. No time or motion is wasted reclaiming or "doctoring" parts made from APOLLO ChromSteel. Every depressed area is fully polished. There are no brown rings around punch outs. The mirror finish is identical all over every part.

When satined, the texture of the finish is the same from one shipment to another. You don't have to sort parts in an "endless game" of trying to match doors and tops. Every door and every top made of APOLLO Satined ChromSteel is interchangeable regardless of when it was made. With protex covering still on them, these parts may be attached to the stove with the assurance they will match when the protex is removed.

Seeing the improvement in your own equipment through the use of APOLLO ChromSteel is believing. Arrange now to stamp a few tops, doors or any other parts from APOLLO ChromSteel so that you can compare these with chrom plate or any other material you are now using. Write or phone specifications today. Samples will be available at the appointed hour for this demonstration in your own plant.

Confidentially yours,  
APOLLO Metals, Inc.

**APOLLO METALS, INC.**

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## PEI Announces Shop Practice Forum Program

A complete program of technical papers for the 23rd Shop Practice Forum has been announced by the Porcelain Enamel Institute. The Forum will be held November 1-3 at Ohio State University, Columbus.

Sessions will be devoted to five general categories: processing methods, materials and equipment; base metals and fabrication; improved quality through testing and controls; and direct-on cover coat enameling.

### PROCESSING METHODS, MATERIALS AND EQUIPMENT

INERTS IN ENAMELS, V. R. Luster and E. E. Bryant, Ferro Corp.

NEW CONCEPTS IN ENAMELING FURNACES, J. Ade, Sunbeam Equipment Corp.

AN ENAMEL CONCEPT EVOLVING FROM COMPETITIVE MATERIALS, W. D. Turner, Porcelain Metals Corp.

PICKLING AND ETCHING TO DEVELOP PORCELAIN ENAMEL BOND, J. J. Canfield, Armco Steel Corp.

THERMAL CLEANING OF METAL, W. Cornelius, The DeVilbiss Co.

### PORCELAIN ENAMELED AUTOMOTIVE EXHAUST SYSTEMS

AN IMPROVED METHOD OF PICKLING, R. Delott, Chicago Vitreous Corp.

NEW DEVELOPMENTS IN PORCELAIN ENAMELED EXHAUST SYSTEMS, W. E. Pierce, Porcelain Enamel Institute.

(Other speakers to be announced.)

### NOTABLE LECTURE SERIES

PROPERTIES, BEHAVIOR CHARACTERISTICS AND STRESSES IN PORCELAIN ENAMELS, T. S. Shevlin, The Ohio State University.

### BASE METALS AND FABRICATION

CRITICAL GRAIN GROWTH OF SPECIAL LOW-CARBON STEELS, C. W. Beattie, Armco Steel Corp.

DRAWABILITY OF SPECIAL LOW-CARBON STEELS, Bethlehem Steel Co.

PROGRESS REPORT ON SPECIAL LOW-CARBON STEELS, R. L. Myers, Armco Steel Corp.

PROGRESS REPORT ON SPECIAL LOW-CARBON STEELS, E. H. Mayer, Bethlehem Steel Co.

PROGRESS REPORT ON SPECIAL LOW-CARBON STEELS, D. A. Toland, United States Steel Corp.

### IMPROVED QUALITY THROUGH TESTING AND CONTROLS

THE AUSTIN CELL, B. O. Austin, Westinghouse Electric Corp.

DETERMINATION OF NICKEL DEPOSITS ON STEEL BY X-RAY FLUORESCENCE, A. J. Iwaszko, The O. Hommel Co.

CARE AND USE OF MILL ADDITIONS, H. J. Smith, Pemco Corp.

QUALITY VERIFICATION PROGRAM, B. W. King, Battelle Memorial Institute.

DISTINCTNESS-OF-IMAGE GLOSSMETER, J. C. Richmond, National Bureau of Standards.

THE EFFECT OF DIFFERENT WATERS ON GLASS

DURABILITY, L. R. Erwin, Day & Night Mfg. ENAMEL REQUIREMENTS FOR HOT WATER STORAGE TANKS, C. Strobach, Rheem Mfg. Co.

ENAMEL REQUIREMENTS TO MEET ENVIRONMENTAL EXTREMES IN WATER STORAGE TANKS, F. W. Nelson, A. O. Smith Corp.

VALUE IMPROVEMENT OF ENAMEL OPERATIONS, P. W. Butters, General Electric Co.

ALKALI TEST DEVELOPMENT, PEI research associate.

### DIRECT-ON COVER COAT ENAMELING

PRODUCTION EXPERIENCE WITH COVER COAT

DIRECT-ON STEEL, R. D. Forth, Roper Corp.

AN ACCELERATED PICKLE PROCESS FOR COVER

COAT DIRECT-ON STEEL, T. L. Stalter, Pemco Corp.

GENERAL CONSIDERATIONS FOR COLORED COVER COAT DIRECT-ON STEEL, H. Afferbach and R. Creviston, Ingram-Richardson, Inc.

PRODUCTION ONE-COAT ENAMELING EXPERIENCES WITH NICKEL OXIDE COATINGS, F. W. Nelson and J. D. Sullivan, A. O. Smith Corp.

RELATIONSHIP OF PICKLING, NICKEL PICK-UP AND ADHERENCE OF ONE-COAT ENAMELING APPLICATION, L. M. Bernick, Inland Steel.

DIRECT-ON COVER COAT EXPERIENCES, S. C. Davis, Daco Corp.

DIRECT-ON COVER COAT EXPERIENCES, J. C. Swartz, Westinghouse Electric Corp.

NEW MARKETS FOR DIRECT-ON COVER COAT,

J. R. McCord, Ferro Corp.

## For product finishers another new from Binks

# NEW compact PUMP for airless spray painting

## EXCLUSIVE! now spray direct from original 55-gal. containers

This new Binks Model 41-8881 compact pump mounts directly into the bung of original 55-gallon containers . . . eliminates the cost of transferring material to another container before spraying.

The pump is designed for single gun airless spraying of protective and decorative coatings. All parts—which come in contact with the fluid being sprayed—are made of

non-corrosive stainless steel. Parts subject to wear are of a special, hardened stainless steel.

Binks airless spraying gives you the speed and coverage of spray painting with minimum overspray—paint goes where you want it . . . not into the air. Drift is greatly reduced, making this equipment ideal for use indoors or out. Result: savings in time and materials.

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### Armco Announces Expansion

Armco Steel Corp. has announced completion of the major phase of its \$100 million capital expenditures program in the Greater Pittsburgh area. At a recent tour of the company's Butler Works, members of the press were shown \$80 million worth of new facilities primarily aimed at stepping up Armco's output of "space age" stainless steel for supersonic aircraft and missile use.

Another phase of the expansion program will be completed next year when

a new combination pipe mill goes into production at Armco's National Supply Div. plant at Ambridge, Pa.

### Republic to Operate Bright Annealing Facility

Republic Steel Corp. has announced plans for what it calls the largest bright annealing facility in the industry. The new unit is expected to be ready for start-up in late January 1962, in Massillon, Ohio.

The unit will be capable of turning out sheets up to 60 in. wide and up to

3/16 in. thick. Annual capacity is estimated at 55,000 tons. The company recently announced the start-up of a smaller vertical bright annealing line, also in Massillon, which provides stainless steel strip up to 24 in. in width.

### Ling-Temco-Vought, Inc. Changes Division Name

Ling-Temco-Vought, Inc. has announced the change in name of its consumer and industrial products division to LTV Industrial. Clyde Skeen, executive vice president of LTV, Inc. said the name change resulted from the recent combination of Ling-Temco Electronics, Inc. and Chance Vought Corp. LTV Industrial was formerly Temco Industrial, a division of Ling-Temco.

One of three members of the corporation's commercial and industrial products group, LTV Industrial recently entered the national appliance market with the introduction of the Ling-Temco dishwasher (see page 44 of this issue).

### Controls Co. Buys Thermac

Controls Co. of America, Schiller Park, Ill. has acquired the Thermac Co., Corona, Calif., a manufacturer of gas controls for home heating. Thermac will be operated as the Thermac Div. of Controls Co. Louis Putze, Controls Co. president, and E. W. McKinley, president of Thermac, made the joint announcement.

### Penn Controls Acquires Baso, Inc.

Ralph S. Penn, president of Penn Controls, Inc., Goshen, Ind. and H. E. Toelle, president of Baso, Inc., Milwaukee, Wis., announced recently the acquisition by Penn Controls of the business, goodwill and principal operating assets of Baso, subject to the approval of Baso stockholders.

Penn Controls manufactures a broad range of products for the refrigeration and air conditioning industry. Baso produces automatic controls, switches and valves for gas burning devices in domestic and industrial markets.

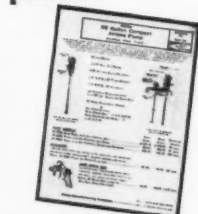
### Space for ARI Exposition Reported 85 Percent Sold Out

More than 85 percent of the exhibit space for the 12th Exposition of the Air-Conditioning, Heating and Refrigeration Industry, to be held February 12-15, 1962, has been contracted for by exhibitors.

According to George E. Mills, show director for ARI, sponsor of the exposition, a wider variety of exhibits than ever before is expected, including air



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● Our long time experience in *producing AND using* Frits gives us a practical "Know-How" that has enabled our Frit customers to *Trim The Fat* in their enameling costs.

Old man 'practical experience' is a hard guy to whip. Here at Ing-Rich top flight ceramic engineers have to prove their case under actual production conditions to our enameling plant technicians.

Ing-Rich has enjoyed a high quality reputation in the enameling field over a long period of years. In our large

enameling plant where we both enamel our own products and do a very large job enameling volume we are just as interested in trimming the fat as you are . . . and the 'prove your case' situation, we have at Ing-Rich produces Frits which are giving us, and our Frit customers, better enameling results at lower costs.

The combination of Ing-Rich plant tested Frits and Ing-Rich practical enameling technicians might be able to help you *Trim The Fat*.

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LIFETIME  
Porcelain Enamel Products  
**INGRAM-RICHARDSON, INC.**  
OFFICES, LABORATORY AND PLANT  
FRANKFORT, INDIANA



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conditioning, heating, and refrigeration end products, as well as components and allied equipment.

### Tinnerman Chairman Dies

Albert H. Tinnerman, board chairman of Tinnerman Products, Inc., died recently at Cleveland's Fairview Park Hospital. He was 82.

Tinnerman developed the Speed Nut spring tension fastener, which was patented in 1924. The fasteners were used on the company's ranges, which were produced up to 1940. At that time the entire organization was adapted to fastener production.

He was born in 1879 in Cleveland. After attending school he became active in his father's stove manufacturing and hardware business.

### International Enameling Congress

The 3rd International Congress in Vitreous Enameling will be held October 1-7 in Venice and Varese, Italy. Sponsored by the International Enamelers Institute, the Congress has been organized by Centro Italiano Smalti Porcellanati di Milano, Italy.

The main purposes of the Congress, according to Dr. Giuseppe Moneta, CISP president, are to develop contacts among enamelers of all countries and to make possible an exchange of ideas on enameling and its technical problems.

A comprehensive program of technical papers has been scheduled, plus several factory visits and a variety of entertainment. Dr. Paul A. Huppert of the United States will be one of the speakers.

### Industry Meetings

→ FROM PAGE 49

#### PACKAGING

Packaging Machinery Manufacturers Institute Show of 1961, Cobo Hall, Detroit, Mich., November 7-10, 1961.

#### HEATING, AIR CONDITIONING

The 48th Annual Convention of the National Warm Air Heating and Air Conditioning Association, La Salle Hotel, Chicago, Ill., November 8-10, 1961.

#### AIR CONDITIONING

The Air Conditioning and Refrigeration Institute's Annual Meeting, The Homestead, Hot Springs, Va., November 12-15, 1961.

#### NEMA

The National Electrical Manufacturers Association's 35th Annual Meeting, The Plaza Hotel, New York City, N. Y., November 16, 1961.

#### AUTOMATIC MERCHANDISING

The National Automatic Merchandising Association's 1961 Western Conference and Exhibit, Ambassador Hotel, Los Angeles, Calif., December 1-3, 1961.

MPM OCTOBER • 1961



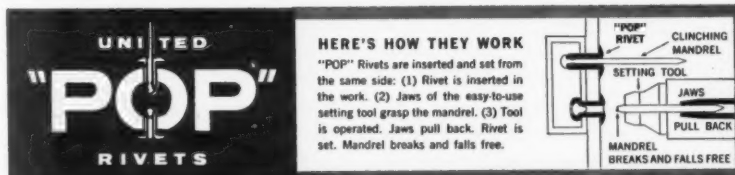
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**UNITED "POP"® RIVETS**  
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*Diversey Field Technical Advisors review a finishing problem with laboratory technicians.*



## DIVERSEY develops new "polishing" process for WESTINGHOUSE

*... helps simplify quality control, cuts costs*

A unique new answer to the quality-cost squeeze resulted when the Diversey FINISHING COUNCIL helped solve a finishing problem at Westinghouse Electric Corporation's Water Cooler Division, Columbus, Ohio.

**The problem:** polishing the stainless steel top plate used on the new Westinghouse Thermal Electric Water Cooler. Mechanical polishing made uniform-quality standards difficult to maintain, and reject rates were high.

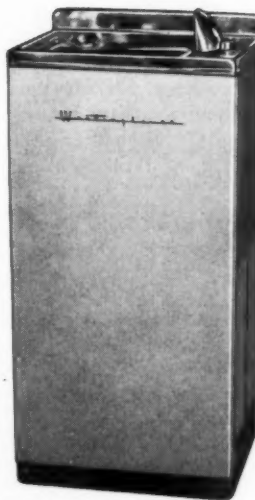
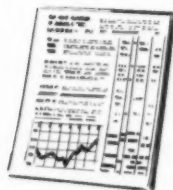
### **New method based on Diversey DS-9 Stainless Steel Process**

The Diversey FINISHING COUNCIL, working with Westinghouse production and quality control engineers, came up with a new chemical dip process, tailored to Westinghouse requirements. The new method was designed around Diversey DS-9 Stainless Steel Process.

**The result:** a top-quality, uniform finish is being maintained on every top plate through chemical rather than mechanical process; quality-control has been simplified; production costs have been reduced substantially on this operation; reject rate has been cut to a minimum.

### **FREE Process Evaluation**

*A fresh, thorough look at your production methods by the Diversey FINISHING COUNCIL may very well show you a better way to keep your finishing costs in line—and your quality up. It will add to your production team experienced technical field advisors who are backed by technicians in modern Diversey Laboratories. These men will review every step in your finishing operations. Their suggestions have proved invaluable in many plants.*



*New WESTINGHOUSE Thermal Electric Water Cooler.*

**CALL OR WRITE:** The Diversey Corporation, FINISHING COUNCIL, 212 West Monroe Street, Chicago 6, Illinois. In Canada: The Diversey Corporation (Canada) Ltd., Clarkson, Ontario.

# DIVERSEY®



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### DIFFERENTIAL PRESSURE GAGE

A new differential pressure gage is described in Bulletin E10, available from Pall Corp. The bulletin contains specifications, drawings and ordering information. The gage it describes is a leak-proof model operated by a magnetic coupling. It is designed for indicating up to 60 psid in systems up to 3000 psi.

Circle No. 114 on Reader Service Card.

### SEALS AND FASTENERS

A 16-page catalog has been published by the A.P.M. Corp. It provides complete information on the company's entire line of explosion and high-pressure seals for switches and shafts; high-pressure self-sealing fasteners; transparent and flexible switch seals; power connectors with auto-deflecting grounding blades; and other A.P.M. products.

For each product in the line the catalog gives dimensional drawings, part numbers, complete specifications and ordering instructions.

Circle No. 115 on Reader Service Card.

### DELTRIN APPLICATIONS

A 24-page booklet published by Cadillac Plastic & Chemical Co. describes applications and properties of Deltrin acetal plastic. Included in the description are design factors, including strength and toughness; dimensional stability and resistance to solvents; and fabricating and finishing details of both molded and machined parts.

Tables of properties and test results accompany each general subject heading. In addition, the booklet includes a summary table of properties according to standard ASTM tests. Ten applications in production are illustrated and described.

Circle No. 116 on Reader Service Card.

### 162-PAGE FASTENER CATALOG

The "most complete pricing catalog ever published," covering fasteners in stainless steel, brass, bronze, aluminum and monel has been issued by Albany Products Co., Inc. The 162-page catalog lists over 40,000 different sizes, styles and types of fasteners in stainless and nonferrous.

Nine classes of fasteners, always previously treated as specials, are listed in the catalog as standard items. Every size of every item listed is clearly specified as to whether it is a stock item, in inventory and available for same-day shipment, or as a non-stock item. Complete information is given on the application of AN, MS and NAS specifications.

Circle No. 117 on Reader Service Card.

### PLASTICS COMPARISON CHART

Comparisons of the major properties offered by nine leading industrial plastics are summarized in graphic form in a twelve-page report on cost and performance

issued by Marbon Chemical Div., Borg-Warner Corp. The report, which compares and evaluates the major properties of the company's brand of polymers and eight other plastics, is based on recently published data from each manufacturer. Comparison graphs are employed to demonstrate performance of the company's material, nylon, acetal resin, cellulose acetate butyrate, cellulose acetate, modified acrylic, polypropylene, linear polyethylene and high-impact styrene. Six separate graphs compare the plastics for overall performance in these vital areas: 1) cost — measured in cubic inches per dollar, 2) heat deflection at 264 psi, 3) impact strength at room temperature, 4) impact at low temperature, 5) tensile modulus or rigidity, and 6) hardness. A seventh, cumulative properties comparison chart reveals the total performance value for each of the nine plastics.

Circle No. 118 on Reader Service Card.

### SILICONES IN INDUSTRIAL FINISHES

A new 16-page bulletin describing silicone-based industrial finishes and their capabilities is available from the Silicone Products Dept., General Electric.

Designated CDS-294, the publication is liberally illustrated with both black and white and full-color photos of comparative testing of silicone high-temperature coatings and other coatings under a variety of test conditions as well as in actual applications. Included in the publication are discussions on range of colors available and information on applications.

Circle No. 119 on Reader Service Card.

### ANODES AND PLATING CHEMICALS

The full line of Hanson-Van Winkle-Munning Co. anodes, anode accessories and chemicals for electroplating and metal finishing are detailed in a new bulletin. Nickel, cadmium, brass and bronze, copper, lead and zinc anodes are described and illustrated. Various types of nickel anodes are listed along with recommended applications and pH ranges. One full page of drawings gives instructions on how to order hooks for round, flat and shaped lead anodes.

The bulletin also lists salts commonly used in electroplating baths and a number of brighteners used in H-VW-M solutions.

Circle No. 120 on Reader Service Card.

### WELDING AUTOMATION

A new 16-page catalog titled "Welding Automation" illustrates 68 special welding units with brief captions to describe the specific functions of the unit. Covered are special resistance welders, special arc welders, standard resistance press welders and magnetic force welders.

Circle No. 121 on Reader Service Card.

### POLISHING AND BUFFING

Five new descriptive catalog sheets have been announced by the Packer Machine Co. Complete specifications on five different types of automatic units are offered, including information on work capacity, production rates, buff heads, wheels, head adjustment, stand adjustment, motors, controls, work tables and available accessories.

Circle No. 122 on Reader Service Card.

### TRICHLOROETHYLENE AND DEGREASING

The Uddeholm Co. of America has released a 16-page booklet describing its Trichlorethylene and degreasing equipment. The correct selection of the vapor, spray or immersion methods are discussed in relation to various applications. Photographs show several types of standard design and custom-built degreasing units, including a unit for continuous degreasing of cold rolled strip or spring steel.

Circle No. 123 on Reader Service Card.

### ALL-NYLON FASTENER

A four-page bulletin offered by Elastic Stop Nut Corp. of America describes an all-nylon, quick-release fastener. Designated type NY-Q, the one-piece molded-nylon fastener is wedge — or keystone shaped. The base of the fastener has ramp-shaped corners for easy tightening and pull. The quarter-turn engagement is halted by stops molded into the central base of the fastener.

Circle No. 124 on Reader Service Card.

### ALUMINUM PROCESSING PRODUCTS

"Wyandotte Products for Aluminum Processing" is the title of a recently published folder available from J. B. Ford Div., Wyandotte Chemicals Corp. The folder covers etching, cleaning, desmutting, paint stripping, barrel finishing, brightening, paint preparation and deoxidizing.

Circle No. 125 on Reader Service Card.

### POWER PRESS SAFETY DEVICE

Advantages of Saf-T-Bloc, an adjustable safety positioner which eliminates accident potential and reduces power press downtime, are detailed in a new information sheet available from Duff-Norton Co. The new one-piece safety block is used for rapid and secure snubbing of power presses during die servicing and maintenance operations.

Circle No. 126 on Reader Service Card.

### CYCOLAC FOR APPLIANCES

A current issue of "Marbon Product News," offered by Marbon Chemical, Div. of Borg-Warner, features nine new applications of Cycolac brand polymers in 1961 home appliances. Described and illustrated are a transistor radio, an electric floor washer and a water softener, plus several small electric housewares.

Circle No. 127 on Reader Service Card.

### BULLETIN ON CONVEYING SYSTEMS

Bulletin No. 500 "How to plan and install your own conveying system" has been issued by Conveyor Systems, Inc. Their bulletin is designed to serve as a handy guide in planning conveyor needs. In addition to a list of equipment available, a check list of questions to be answered in planning a conveyor system is provided.

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### CLOSED CELL NEOPRENE

Various applications of closed cell neoprene, including use in a dishwasher door



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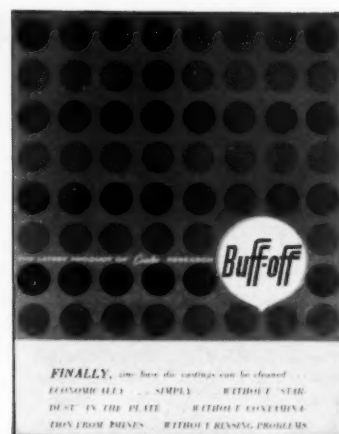
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gasket material, are described in a bulletin recently issued by the Elastomer Chemicals Dept. of du Pont. The material is said to have low water absorption and good ozone and weather resistance. In addition, it can be turned easily into a tight radius and can be surface finished if desired.

Circle No. 129 on Reader Service Card.

#### CORROSION RESISTANCE OF ZIRCONIUM

"The Corrosion Resistance of Zirconium" is a new publication offered by the Zirconium Association. The 14-page booklet contains detailed graphs for over 100 highly corrosive media in concentrations up to 100 percent and temperatures up to 400 F. The data was compiled from information developed by the country's leading industrial corrosion testing laboratories.

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#### ARC WELDING PRODUCTS

Information concerning its full line of arc welding products is contained in The Lincoln Electric Co.'s new bulletin titled "Weldirectory of Arc Welding Electrodes, Equipment and Supplies." The bulletin presents information on AWS electrode classification and discusses correct electrode selection for every type of welding application.

Circle No. 131 on Reader Service Card.

#### CORROSION-RESISTANT NICKEL ALLOYS

A new technical data sheet discusses corrosion resistance of Colmonoy nickel alloys produced by Wall Colmonoy Corp. The literature lists the corrosive media in which Colmonoy nickel alloys are generally resistant and discusses corrosion resistance in general terms. A corrosion-comparison bar chart is also included.

Circle No. 132 on Reader Service Card.

#### RADIANT HEATING PROCESS

Fostoria Corp. offers a new eight-page brochure explaining the principle of radiant heat and describing the company's equipment designed for utilization of the electric infra-red radiant heating process. Also shown are some of the industrial applications for the equipment.

Circle No. 133 on Reader Service Card.

#### GUN DRILLING TOOL

The new Star Double-Jet gun drills are described in a catalog sheet published by Star Cutter Co. The gun drill is said to provide up to three times the tool life of conventional single-hole gun drills in many applications. Included in the data sheet are a detailed description of the gun drills, cross-section drawings and close-up photographs showing coolant flow, and grinding nomenclature.

Circle No. 134 on Reader Service Card.

#### STAR TOLERANCE RINGS

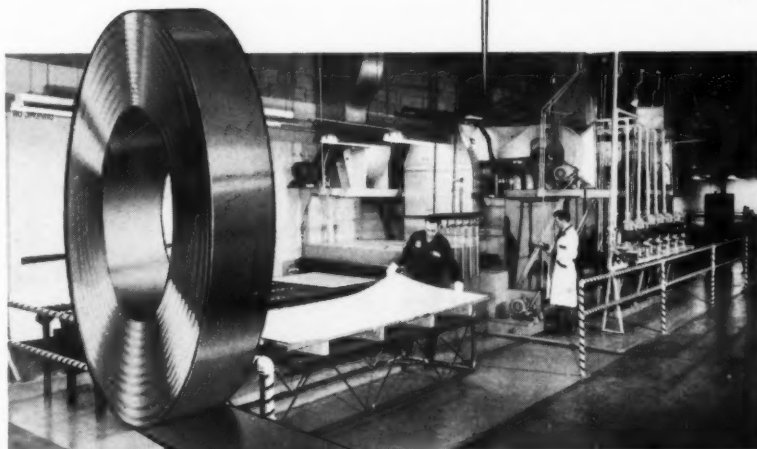
A catalog detailing the line of Star tolerance rings is offered by Roller Bearing Co.

TO PAGE 93 →

MPM OCTOBER • 1961

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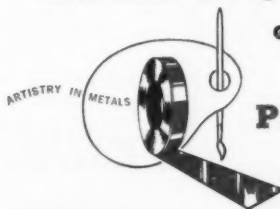
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## New literature

→ FROM PAGE 11

of America. The tolerance ring is a corrugated, open ring of hardened steel, with straight rims at the ends of the corrugations. It serves as a wedging shim between two cylindrical members.

Typical applications include holding anti-friction and plain bearings, bobbins, cams, couplings, fans, gears, impellers, knobs, pulleys, pins spacers and wheels, etc. One application described and illustrated is the use of the tolerance rings in a floor polisher.

The catalog includes eight pages of size and application specifications.

Circle No. 135 on Reader Service Card.

### VIBRATION CONTROL

A 16-page brochure published by Lord Mfg. Co. provides comprehensive information on techniques and equipment for controlling vibration, shock or noise.

Included in the literature are an explanation of the benefits of vibration, shock and noise control, descriptions and illustrations of the products available from Lord for this purpose, and a description of the firm's facilities.

Circle No. 136 on Reader Service Card.

### ULTRA-FINE WIRE

Molecu Wire Corp. has completed for distribution a four-page bulletin describing the properties, characteristics and applications of Neuroloy, an ultra-fine wire which is essentially a copper/nickel alloy used in precision instrumentation. By means of illustrations, charts and diagrams the bulletin describes the resistance and weight, physical characteristics, resistance change vs. temperature and other details.

Circle No. 137 on Reader Service Card.

### CONTROLLING SPRING COSTS

A 16-page brochure issued by Associated Spring Corp. is designed to aid producers of products containing springs in controlling costs of handling, quality and procurement. Among the subjects of benefit to spring buyers is an explanation of unique custom packaging for various spring types to eliminate tangling and deformation, ease inventory counts and facilitate production line dispensing.

Circle No. 138 on Reader Service Card.

### HIGH-CAPACITY SWITCHES

A data sheet describes in detail a 22-ampere steady state current capacity switch type which is said to have more sensitive operating characteristics than other high-capacity switches. The data sheet includes photographs, dimension drawing, complete electrical data and operating characteristics and pricing information. Manufactured by Micro Switch the sensitivity of the operating characteristics is said to be reflected in the .001 in. maximum differential travel and .005 in. minimum overtravel.

Circle No. 139 on Reader Service Card.

### EXPANSION FITTING

A bulletin on expansion as a time saving, reliable assembly procedure has been issued

by Cincinnati Sub-Zero Products. The 12-page booklet contains a full case history, along with photos illustrating expansion fitting bearing raceways. Also included are tables of expansion coefficients and monograms for calculating rates of thermal expansion and determining the temperatures required.

Circle No. 140 on Reader Service Card.

### DRIP-PROOF MOTORS

A new bulletin describing its line of open drip-proof fractional horsepower motors has been announced by The Leland Ohio Electric Co. Motors range from 1/6 through 1 hp for standard voltages, frequencies and speeds, continuous and intermittent duty.

The bulletin describes single-phase motors for driving such machines as air conditioning units, compressors, pumps, blowers, coolers, circulators, dispensers, machine tools, stokers, conveyors and sanders—with starting torque ranging from 250 to 350 at full load torque. Single-phase motors are available with thermal overload protection as an optional feature.

Circle No. 141 on Reader Service Card.

### INFRA-RED OVENS

A guide to the use of gas and electric infra-red ovens for heating, drying and curing is now available from Infra-Red Systems, Inc. The bulletin contains sketches illustrating ovens for various applications, including finishing and adhesive drying. The bulletin also considers the factors involved in designing ovens using these infra-red heat sources.

Circle No. 142 on Reader Service Card.

### CERAMIC DIELECTRICS

An eight-page booklet offered by Erie Technical Ceramics is designed to inform the OEM users of ceramic dielectrics and piezoelectric ceramic transducers of the manufacturing, design and research facilities available from the company. Featured are present products being manufactured and their uses.

Circle No. 143 on Reader Service Card.

### STAINLESS STEEL DATA

A 16-page booklet available from Eastern Stainless Steel contains data on stainless steel, including types, size range for converted plates, Sendzimir and handmill limitations, and finishes available.

Circle No. 144 on Reader Service Card.

### SPECIAL PROCESS BRASS STRIP

An illustrated brochure on a special process brass strip is available from Chase Brass & Copper Co. Characteristics, applications and performance of the strip are described in the brochure.

Included are photos and charts comparing Chase S-19 brass with conventional deep-drawing brass. Among the claims made for the strip are that it has a super-fine grain that is uniform in structure and that it is extremely scratch and dent resistant.

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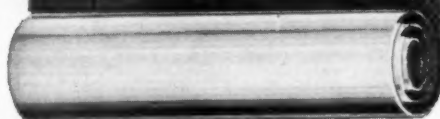
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Circle No. 307 on Reader Service Card.

## Quality, utility and reliability core of GE sales effort

A new line of automatic washers, dryers and a combination by General Electric was introduced to the press at Appliance Park, Louisville, September 14, as a prelude to showings to distributors and dealers, to start on October 13. MPM is honoring a release date of October 13, so that no description or photos of the new line will be shown, but F. H. Holt, general manager of the Home Laundry Department, was asked for a rundown on GE's plans and policies relating to the 1962 market. The following is taken from an exclusive MPM Dictet interview.

"The General Electric 1962 line is primarily aimed at the consumer needs that we have been able to identify through intensive field studies.

"The line of products that we are bringing out consists of basically the same machine that was put into production last year, as far as its principal parts are concerned. This machine was actually field tested a year before it was put into production, and over nine million pounds of clothes were washed before factory production lines started to roll. This type of thorough pre-testing permitted us to be sure that the reliability actually existed in the machine before the design was frozen.

"Since that time, the quality control methods have been perfected even further with a brand new quality control audit lab put into operation." (See "Home Laundry Equipment Reliability Pursued Through Quality Control," September 1961 MPM.)

(According to Holt, 40 percent of the automatic washers purchased in 1962 will represent the second or third unit owned in the purchaser's lifetime.)

"In addition to reliability, which is such an important factor, the big need as far as the majority of the customers is concerned is for utility and washability. This was built into the machine, which was brought out in October of last year, by an improved washing system and increased capacity. While 12-lb capacity was something the surveys indicated the customers wanted, this was only one of many things they were asking for. They were asking for greater reliability and they were asking for simplicity and utility of operation.

"We believe that our obligation to the customers is to show them their needs and how their needs can be served by concentrating on what the machine will do for them, rather than having the customers so interested in price.

"We find entirely too many customers in the market today are willing to accept the same kind of washing machine that they are trading in, instead of upgrading their washing concept to include features that are available in the newer machines.

"We are convinced that we are going to be doing the customer a disservice unless we find a way to show her how the machine that has the features she needs is the one she should buy, instead of concentrating entirely on the lower priced model that has only the features that she bought some nine years ago.

"All of these new features that have been put in washing machines in the last five or six years can be secured by the customer for less than one cent a load during the useful life of the machine, as compared to a machine that she might have purchased some nine or ten years ago."

(Easy financing that is available in market places today makes it possible for the customer to have these advantages for a very small additional time payment. She can move up from a minimum model, for instance, to a \$60 higher priced machine, and if the machine will, as anticipated, last 12 years, this is \$5 a year, or an estimated less than one cent a load.)

"Our success in the year 1961 with the new 12-lb washer has shown that when dealers concentrate on selling features, they can do a lot better selling job and improve their profit, as well as the profit for the manufacturer."

# Reader Service

## MOTOR CAPACITOR SERVICE GUIDE

A combination Catalog-Service Guide on capacitors for ac applications has been released by the Sprague Products Co. In addition to complete descriptions and listings of Sprague motor-starting electrolytics as well as Clorinol-impregnated motor-run capacitors, this comprehensive guide, Form C-194, contains pages of useful service and replacement information on motor capacitors. It also includes an Interchangeability Chart incorporating capacitors made by Sprague and eleven other manufacturers.

Circle No. 101 on Reader Service Card.

## ADJUSTABLE PRESSURE SWITCH

Literature describing a leak-proof, adjustable pressure and differential pressure switch for use in fluid systems operating at up to 250 psi is available from Pall Corp. Bulletin E8 includes photographs and drawings of the switch together with a description of its construction and operation, optional variations and available accessories.

The Deltadyne switches covered by this bulletin are adjustable within the differential pressure range of 0.125 to 16 psi. They incorporate the basic Deltadyne principle of magnetic transmission of the pressure differential to the actuating mechanism, eliminating mechanical linkages and sealing problems. Exact actuating pressure is set by turning a direct reading dial.

Circle No. 102 on Reader Service Card.

## FLAT CONDUCTOR CABLE CONNECTORS

A complete system for inter-connecting flat conductor cable is covered in a bulletin offered by The Thomas & Betts Co. The Pos-E-Flex system is said to be an efficient, versatile and reliable method for inter-connecting flat conductor cable, or adapting flat cable to conventionally-wired equipment. Direct conductor-to-conductor contact is said to provide the best possible electrical flow, with no intermediate joints or connections to increase resistance or provide sources of error. Simplified, compact construction facilitates installation, speeds production, and lowers overall installed costs.

Circle No. 103 on Reader Service Card.

## SPRING WASHER BULLETIN

Four types of spring washers and their complete specifications are described in a brochure offered by George K. Garrett Co., Inc. The washer types are: Belleville spring washer; Sawtooth Belleville spring washer; arc spring washer; and three-wave spring washer.

Circle No. 104 on Reader Service Card.

## V-BAND COUPLINGS

A 16-page booklet entitled "Economies of the V-Band Coupling" has recently been produced by the Marman Div., Aeroquip Corp. The booklet, No. SDP-2, gives specific cost comparisons between V-Bands and other joining methods. It also explains how many of the "hidden costs" of manufacturing can be reduced by using V-Band couplings. Savings in weight and installation or assembly time are examples of other types of economies illustrated in the

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booklet. Adaptability of design is also discussed in the pamphlet for manufacturers of filters, separators or containers.

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#### ELECTRONIC AIR CLEANERS

A new line of heavy-duty electronic air cleaners with pushbutton automatic control is described in a catalog available from Westinghouse Electric Corp. Sections of the new booklet are devoted to the principles of electronic air cleaning, construction features of the heavy-duty Precipitron unit with dual header washing, selection data, and details on specific application arrangements.

Circle No. 106 on Reader Service Card.

#### 98-PAGE CONTROL CATALOG

Full information on General Control Co.'s line of heating controls is presented in a new 98-page catalog. Introduced in the new catalog are the firm's "Sheer Line" room thermostats. Also shown is the company's "Midgitrol" line of compact gas valves. This series, said to be noteworthy as a development toward increased standardization, includes a variety of interchangeable operators—24 volt, millivolt, solenoid or bulb and capillary—mounted on a single integral body which incorporates all other necessary control functions.

Among the other products discussed are lightweight switching mechanisms, and the TD series of time delay relays.

Circle No. 107 on Reader Service Card.

#### PRESSURE-SENSITIVE TAPE BOOKLET

"How to Select a Pressure-Sensitive Tape" is the title of a helpful booklet published by Dutch Brand Div., Johns-Manville. The two-color, four-page booklet, DB-56A, contains a wealth of interesting and valuable information on the types of tapes available, how they are constructed, and the factors involved in choosing a particular tape for a specific application.

The contents include an introduction that discusses factors influencing choice of a tape, a section defining what a P-S tape is and how it is constructed, a full page devoted to trouble-shooting problems concerned with tape failures, and a glossary of terminology applied to tapes. In addition, the booklet contains a listing of the complete line of Dutch Brand pressure-sensitive tapes, and available technical literature devoted to specific types of tapes.

Circle No. 108 on Reader Service Card.

#### INTERLOX PRODUCTS

Interlox products used in the pre-paint treatment of steel are described in a brochure published by Northwest Chemical Co. According to the brochure, Interlox eliminates pre-cleaning by separate additions of specially formulated, compatible detergents which are added directly to the phosphate bath. The advantages of the process plus a listing of its various uses are included.

Circle No. 109 on Reader Service Card.

#### CRAFTSMAN IN SHEET METAL

"Craftsman in Sheet Metal" is the title of a new 20-page catalog recently released by the Contract Mfg. Dept. of Lyon Metal Products, Inc. The booklet tells a story of what happens from the idea or blueprint stage to the finished product. The various steps are described in a series of photographs and captions. A complete listing of the company's equipment is also included.

Circle No. 110 on Reader Service Card.

#### MECHANICAL PRESS BRAKES

A 12-page bulletin, offered by Verson Allsteel Press Co., presents design details and specifications for Verson junior and intermediate size mechanical press brakes. Three series with capacities of 50, 65 and 90 tons are described. Bed and ram lengths range from 72 to 168 in.

Circle No. 111 on Reader Service Card.

#### INDUSTRIAL TELEVISION

General Electric has issued a four-page bulletin on its new industrial television monitors, including 14, 17 and 21-in. screen sizes in both cabinet and rack-mounted models. The publication outlines the new Intra-Tel closed circuit monitor's specific capabilities and supplies control, accessory, size, and weight information, plus environmental specifications.

Circle No. 112 on Reader Service Card.

#### RESINS FOR ADHESIVES

A new bulletin presents the latest technical data on SP-134, a new, light-colored, heat reactive, phenolic resin for industrial and general purpose elastomer adhesives. Published by Schenectady Varnish Co., Inc., the bulletin includes pictures and graphs depicting tensile shear, peel-back and pre-reacting resin test data.

Circle No. 113 on Reader Service Card.

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## personals

**George E. Rodier** has been promoted to manager of **Maytag Co. Ltd's** parts and service department in Winnipeg, and **Herbert E. Pelzer** has been named to succeed him as regional manager in the firm's western Canada branch.

**Edward L. Kennedy** has been appointed general sales manager of **Waring Products Co.**, subsidiary of **Dynamics Corp. of America**. He was formerly New York district sales manager.

**Melvin A. Hult** has been elected treasurer of **Portable Electric Tools, Inc.**, it has been announced by **John L. Baker**, president.

**James B. Fisher** has been named general manager of sales for **Superior Steel Div.**, **Copperweld Steel Co.** He was formerly Detroit District sales manager.

**Frank L. Tupper** has been named vice president and general manager of **Customade Products Corp.**, a subsidiary of the **Universal Match Corp.** He was also named a vice president of the **Universal Cabinet Div.**, **Universal Metal Products Corp.**, another **Universal Match** subsidiary.

**Kenneth Bucher**, formerly assistant service manager, has been promoted to commercial sales manager for **Speed Queen**, division of **McGraw-Edison Co.** He succeeds **Joseph Groshans**, who will retire effective December 31.

**Ann Louise Olson** has been appointed home service director of **Speed Queen Div.**, **McGraw-Edison Co.**

**John H. Mattern** has been named manager of customer service relations for **Kelvinator**, division of **American Motors Corp.**, according to an announcement by **R. S. Geran**, general service manager.

**John F. Sorenson** has been appointed heat pump and air conditioning sales manager for **Norris-Thermador Corp.**

**Daniel C. Marlow** has been named vice president and secretary of **Burgess Vibrocrafters, Inc.** He was secretary-treasurer.

**Jean Eggert** has been named director of the Home Economics Institute of the **Hotpoint Div.**, **General Electric Co.** She was formerly a specialist in home laundry products.

**Harold Fleit** has been appointed manager of sales of **Worthington Corp.'s Air Conditioning Div.** **William E. Roach, Jr.**, has been named manager of the newly created New England zone, and **Walter J. Lesko** was named Northeast zone manager.

**Douglas L. Hamilton**, **Robert E. Brockway** and **Thomas R. Shepherd** have been appointed to positions in the newly formed **Sylvania Commercial Electronics** organization. **Hamilton** is vice president and general manager, **Brockway** becomes marketing vice president, and **Shepherd** vice president in charge of service.

The appointment of **LeRoy F. Harling** as sales promotion manager for **Harper-Wyman Co.** has been announced by **Philip S. Harper Jr.**, president.

**H. E. Martin** has become chairman and chief executive officer of **Metal & Thermit Corp.** Replacing him as president is **Charles J. Beasley**, formerly vice president and secretary. **H. W. Buchanan**, previously a vice president, has been named executive vice president.

**John C. Hansen** has been named manager of **Bliss & Laughlin, Inc.'s** new steel mill under construction near **Cleveland, Ohio**.

**Herbert K. Rollins** has been appointed sales manager, range division, **Admiral Sales Corp.**, according to an announcement by **Ross D. Siragusa, Jr.**, sales vice president.

**John W. Bolt** has been appointed product manager, packaged heating and ventilating equipment for **American-Standard Industrial Div.**

**Warren A. Dickinson, Jr.** has joined the sales engineering staff of **J. O. Ross Engineering**, division of **Midland-Ross Corp.** He will handle special drying accounts from the **Mt. Prospect, Ill.** office of **Ross**.

**Robert M. Murphy** has been named director of engineering by the **Mallory Timers Co.**, a division of **P. R. Mallory & Co.** He will direct research and development, design, product engineering and test facilities in the firm's **Indianapolis** headquarters.

**Warren A. Brown**, former president of **R. D. Wood Co.**, has been elected chairman of the board of directors of the firm. Succeeding **Brown** is **Fred W. Stakelbeck**, who was elected president and chief executive officer.

**Leonard W. Atchinson**, formerly manager of engineering for room air conditioners, has been appointed to the new position of engineering consultant in the **General Electric Air Conditioning Department**, according to an an-



DICKINSON



MURPHY



STAKELBECK



BROWN



HULT



FISHER



TUPPER



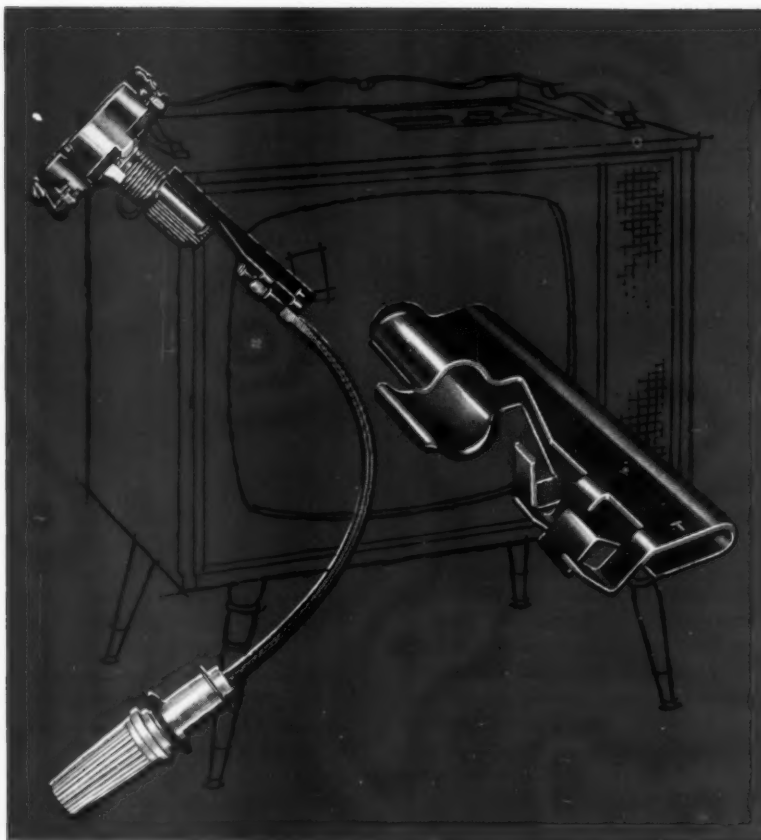
BUCHER



ANN OLSON



MATTERN



A Tinnerman T-Marked Original...

## SPEED CLIP® gives Sylvania easier, more reliable, more flexible assembly

This new Tinnerman-engineered SPEED CLIP fastener provides a faster, more flexible connection between control "pots" and knobs on a TV manufactured by Sylvania Electric Products, Inc. The fastener can be applied wherever similar components are mounted and space limitations pose an assembly problem.

Several advantages are offered over methods previously used. Assembly is easier and faster... mating parts are simply pressed together and secured under live spring tension. Built-in ratcheting action permits overload slippage to protect the control from over-adjustment. Designed for use with a flexible cable, mounting of the control is completely independent of the knob location. They can be perpendicular to each other anywhere within 360°. Finally, this fastener is stamped with the Tinnerman T-mark, as are all SPEED NUT® brand fasteners. This is your assurance that Tinnerman quality and total reliability are going into your products wherever these fasteners are specified.

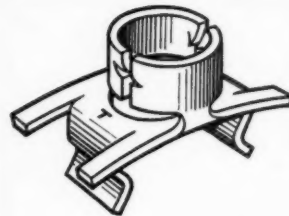
For samples, literature, prices, call your Tinnerman sales office... listed in the "Yellow Pages" under "Fasteners." Or write to: Tinnerman Products, Inc., Department 12, P. O. Box 6688, Cleveland 1, Ohio.



**TINNERMAN**  
*Speed Nuts®*  
Look for the Tinnerman "T"

Circle No. 359 on Reader Service Card.

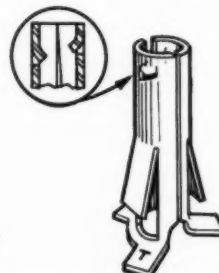
### T-MARK ENGINEERED SPECIALS



**TRANSISTOR CLIP** saves weight and space, snaps quickly into panel... no screws, rivets. Designed for coil form retention, this SPEED CLIP fastener proved ideal for fastening transistors. Tubular retaining collar has excellent heat sink properties, openings at sides and bottom allow air circulation.



**FRONT MOUNTING SPEED CLIP FASTENER** cuts front panel assembly costs on popular washer-dryer. Unique self-retaining SPEED CLIP fastener permits simplified front mounting for easier, faster, lower cost assembly of front panel. No welding, staking, screw driving... ends scrap hazard. Four fasteners engage panel mounting flange as it slips in place over curved spring fingers. Assures firm vibration resistant assembly, yet easy removal for servicing.



**BOWDEN CABLE CLIP** is one of many Tinnerman designs to fasten armored cable. Designed for car instrument panels, it's the perfect answer to through-panel cable fastening problems. No welding, staking, clinching, no special mounting brackets or clamps. Live spring tension prohibits vibration... prevents loosening.

CANADA: Dominion Fasteners Ltd., Hamilton, Ontario.  
GREAT BRITAIN: Simmonds Aerocessories Ltd., Treforest, Wales. FRANCE: Simmonds S.A., 3 rue Salomon de Rothschild, Suresnes (Seine). GERMANY: Mecano Simmonds GMBH, Heidelberg.

nouncement by Carl W. Moeller, department general manager. **William G. Spiegelhalter** has been named to succeed Atchinson as engineering manager for room air conditioners.

**George E. Cossin, Jr.** has been named to the newly created position of parts merchandising manager for the **Kelvinator** appliance division of **American Motors Corp.**

The **Chicago Pneumatic Tool Co.** has announced the appointment of **Russell B. Miller** to the position of general sales manager, with headquarters at the New York general offices.

**Hugh Edwards** has been named manager of the **Bradley & Vrooman Co.**'s packaging research and development department, it has been announced by **Leo S. Guthman**, president.

**William C. Pink** has been appointed manager of **The Maytag Co.**'s Hampton, Iowa plant, it has been announced by **Paul A. Stewart**, manager of manufacturing.

Concurrently, **Leo O. Hays** has been named acting traffic manager of the firm's Newton, Iowa plant.

**Robert L. Shaw** has joined **Admiral Sales Corp.** as assistant to **Carl E. Lantz**, president.

**John Powers** has been named vice president, operations and **Henry De Matteo** has been made manufacturing and works manager, **Verson Allsteel Press Co.**, according to an announcement by **Melvin D. Verson**, president.



POWERS



DE MATTEO

**J. W. Noyce** has been appointed by **Northwest Chemical Co.** to serve accounts in the Chicago area. The firm, a unit of the **Chemical Products Div., Chemetron Corp.**, produces chemicals used in the metalworking industry.

**W. Harrison Graver**, former president, has been named chairman of the board of **Engineering Metal Products Corp.** **Holmes T. Collins, Jr.**, former vice president of **Divco-Wayne Corp.**, has been named president and a director.

**Eugene R. Gelfo** has been appointed sales promotion manager for **Robertshaw-Fulton's Robertshaw Thermostat Div.**, it was announced by **M. B. Gault**, general sales manager for the division.

Three engineering appointments for **Sunbeam Equipment Corp.** have been announced. **John P. Zur** was appointed vice president of engineering; **Willard Roth**, engineering manager; and **Norman J. Acker**, assistant engineering manager. **Zur** was chief engineer and **Roth** was assistant chief engineer. **Acker** had been president of **Mern Industries**.



GELFO



ZUR

**Kenneth M. Piper** has been elected a vice president of **Motorola, Inc.** **Homer L. Marrs** has been named vice president of sales in the communications division, and **William J. Weisz** has been named vice president of communications products.

**William S. Perkins** has been appointed director of purchases for the consumer products group of **Westinghouse Electric Corp.**, it has been announced by **Chris J. Witting**, vice president, consumer products.

The appointment of **James D. Dougherty** as general sales manager of domestic appliances for the **Norge Div., Borg-Warner Corp.** has been announced.

**Charles P. McShane** has been appointed **Crucible Steel Co.**'s manager of technical services, tool steels. He was formerly customer technical service engineer for the Midwest area.

**Hoyt C. Pease** has been named to the new post of vice president, manufacturing of **The Stanley Works**.

**Ernest M. Teichert** and **Clarence Wantz** have been appointed to the new positions of assistants to the general manager of **Robertshaw-Fulton's Robertshaw Thermostat Div.**, according to **Arnold C. Hansen**, division general manager. In the same action, **William C. Olmer** has been named to the post of

# THE MAGNUS METHOD

FOR CLEANING  
AND FINISHING

## LIGHT METALS

Magnus methods, utilizing specialized compounds and equipment specifically designed for the light metals industry, have produced results such as these:

"SPRAY WASHING  
COSTS CUT  
\$3,500 PER YEAR  
BY CHANGING  
TO ONE MAGNUS  
CLEANING  
COMPOUND!"

— An oil filter  
manufacturer.

"CHANGING TO A  
MAGNUS SOLUBLE  
MACHINING  
LUBRICANT  
EXTENDED TOOL  
LIFE UP  
TO 80%."

— A Michigan  
machine shop

"CUT MACHINE  
DOWN-TIME FROM  
3 HOURS A WEEK  
TO  
3 HOURS A MONTH  
OR LESS."

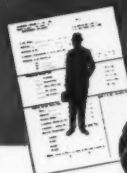
An aircraft engine  
and accessory  
manufacturer.

"MAGNUS CLEAR  
COATING  
COMPOUND  
REPLACED  
ANODIZING,  
CUTTING  
UNIT COSTS  
FROM \$2.00  
TO 25¢."

— An aluminum products  
manufacturer.

These are only a few of the real results produced by the application of effective, economical Magnus Methods.

FREE! Send for Case Histories and Survey Form



Your local Magnus Representative will survey and recommend — without obligation — methods to speed, improve and cut costs in your individual operation.

**magnus**  
CHEMICAL COMPANY INC.

129 South Avenue, Garwood, N. J.

Please send FREE case histories and survey form.

NAME \_\_\_\_\_  
COMPANY \_\_\_\_\_  
POSITION \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
CITY \_\_\_\_\_ STATE \_\_\_\_\_

Circle No. 332 on Reader Service Card.



if she takes pride  
in her home—  
give her a kitchen  
of stainless steel

**McLOUTH  
STAINLESS  
STEEL**—the spotless  
metal for homes and  
home products.

*McLouth Steel Corporation  
Detroit 17, Michigan*



Circle No. 337 on Reader Service Card.

shop superintendent, replacing Teichert. **Charles D. Branson** has been named to succeed Wantz as chief engineer for the division.

Concurrently, Hansen named **John J. Gardner** to the new post of manager, manufacturing engineering.

**John Ufner** has been named Detroit district sales manager by **Superior Steel Div., Copperweld Steel Co.**

**Lee Trillich** has been appointed vice president in charge of production of **Seaporcel Metals, Inc.**

**Robert L. Lozon** has been appointed vice president in charge of purchasing and trade relations for the **Glidden Co.**, according to Dwight P. Joyce, chairman

of the board and president.

**M. H. Zelibor** has been named vice president, manufacturing of **Great Lakes Screw Corp.** He was formerly plant manager at Great Lakes.

**William T. Walling**, formerly a field electro-chemist with **Hanson-Van Winkle-Munning Co.**, has rejoined the firm in the same capacity and in the same territory. He replaces **Donald H. Morris** who has been promoted to district manager in the Chicago area.

**William A. Hopkins** has been appointed product manager, plating division for **Metal & Thermit Corp.** He succeeds **Henry Mahlstedt**, who will remain with the firm in an advisory post.

## A world-wide view

→ FROM PAGE 70

We expect substantial growth and profits from Philco's overseas activities. I must caution, however, that management of these businesses is not a bed of roses. Problems which are faced include unfamiliar languages, unfamiliar legal and corporate practices, populations with different habits and standards of living which must be learned and understood, and appliance products of different sizes and characteristics than those with which we are familiar in the American market.

### What is required?

These circumstances require several ingredients if such an overseas operation is to be successful: managers with

TO PAGE 112 →

UFNER



TRILLICH



ZELIBOR



WALLING



LOZON



HOPKINS



## have you met GRIPCO GUS ?...

If not, you should: he's an expert fastener engineer with a penchant for solving problems; he has 56 years' worth of fastener tricks up his sleeve; his services are free and readily available right in your own backyard.

There are more than two score of GRIPCO\* GUSes representing the Grip Nut Company coast to coast — each a trained technician *first* and salesman *second*. As our *only* representatives, you can be sure each is hand-picked and fully equipped to serve your every fastener need.

You'll find your GRIPCO GUS listed in the yellow pages (under Bolts & Nuts) as the GRIPCO representative.

GUS' GANG: Toplock and Centerlock Nuts, Open and Closed End Cap Nuts, Clinch Nuts, Pilot-Projection Weld Nuts, Countersunk Weld Nuts, Tab Weld Nuts, Flange Nuts, Hex-Finished and Heavy Nuts, Washer Nuts, Self Piercing Clinch Nuts. Specials of every description, 20-page Catalog on request (see GUS).

\*GRIPCO is a registered trademark of Grip Nut Co.

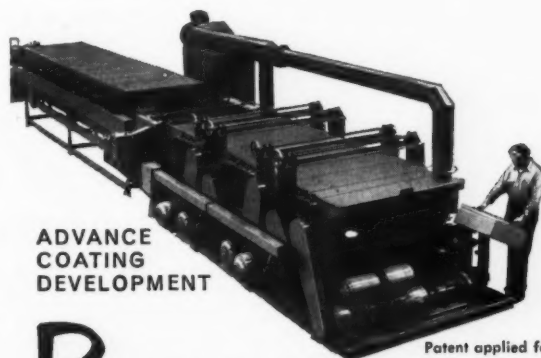
3984



Subsidiary of Heli-Coil Corporation,  
Danbury, Conn.

610 Maple Ave. • South Whitley, Ind.  
Phone: South Whitley 723-5111

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ADVANCE  
COATING  
DEVELOPMENT

## Proven IN PRODUCTION

The New ROTH SIMPLIFIED coating lines mark another advancement for consistent quality drawing. Here is the answer to a highly economical and automated application for dry type drawing lubricants. This fresh approach to an integrated line reflects a 20-year tradition for progressive cost saving production.

- Revolutionary new brush-coater
- High conveyor speeds
- Heavy-duty design
- Minimum floor space

INVESTIGATE THE COMPLETE ROTH LINE NOW!



Circle No. 356 on Reader Service Card.

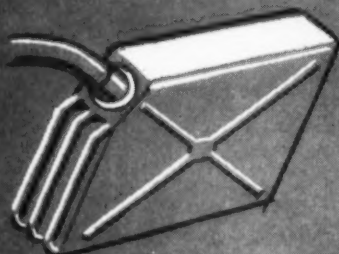
- Used as a water soluble quench for induction hardening.



- Used as an additive to soluble cutting oil and soluble grinding oil emulsions to increase rust protective properties.



- Used as a transparent emulsion for hydrostatic testing.



- Used for lubrication and rust prevention on tube rolling machines.



- Used as a rust preventive in the rinse stage of spray type washers.

**THE METALWORKING INDUSTRY LOOKS TO MACCO FOR LEADERSHIP**

CLEANING COMPOUNDS  
CUTTING LUBRICANTS



DRAWING COMPOUNDS  
RUST PREVENTIVES  
FORGING COMPOUNDS



**you can WELD, BRAZE, FABRICATE, ASSEMBLE, PAINT *right over it***

Better check into MACCO #1961 right now if you are not already familiar with it. Here's a newly developed, multi-purpose water soluble RUST PREVENTIVE that does so many jobs so well, and so economically. You can use less concentration, and it lasts longer. Leaves a film of protection you can work over without further cleaning, and paint over, too. If Rust Prevention for between operations or for storage is part of your operating procedure, then MACCO #1961 is for YOU!

Try it! You'll convince yourself!

**MACCO**  
PRODUCTS COMPANY

FOR THE METALWORKING TRADE SINCE 1927

9210 mp 5. SANGAMON ST., CHICAGO 20, ILLINOIS  
PRESCOTT 9-0800

Circle No. 331 on Reader Service Card.





## editorial voice of the national safe transit program

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DANA CHASE PUBLICATIONS, INC.

Devoted to improving packaging, shipping, and materials handling methods for the appliance and metal products manufacturing industries. This section contains information on plant experience and industry advances for improving packaging and shipping methods, and prevention of in-transit loss. It also contains information on the National Safe Transit Committee's preshipment testing program and reports on NST activities.

## New stapling machine boosts packaging speed nearly 50 percent

**T**O PACKAGE ITS LARGE, industrial metal cabinets, racks, conveyors and utility carriers, which are used by the food industry and institutions, Crescent Metal Products, Inc., Cleveland has adopted a telescope-type corrugated carton. The 275-lb-test, C-flute shipping container is assembled with a Bostitch FC95 "Golden Belt" stapling machine.

According to the company, switching to the stapler from a wire stitching machine has made it possible to increase the packaging production speed almost 50 percent. However, the biggest advantage, the company points out, is that the machine easily secures the bottoms and tops of the cartons without having to make time-consuming adjustments to accommodate different thicknesses of the

containers' corrugation construction.

For example, both the top and bottom units have partial overlap flanges. In addition, the bottom unit's end flaps are scored across the center and doubled back for extra strength at each of the four corners. When forming the unit, the staple must be able to penetrate four thicknesses of C-flute on the end; then must seal a three-layer thickness and, finally, a two-layer thickness. The previously used wire stitcher had to be re-adjusted for each different thickness, noted the company. Almost twice as many staples were required to obtain the same secure hold that is now obtained by using only 15 of the wide crown staples for each unit. Replacing the staples takes only one-half minute.

Circle No. 250 on Reader Service Card.



Using the Bostitch FC95 "Golden Belt" stapling machine, the operator at Crescent Metal Products, Inc. proceeds to seal the top unit of its shipping carton. Previously, a wire stitcher was used to perform the sealing function. The wide crown staples are automatically driven through as many as four thicknesses of C-flute corrugation in the carton.

MPM OCTOBER • 1961

## Electric Straddle Trucks

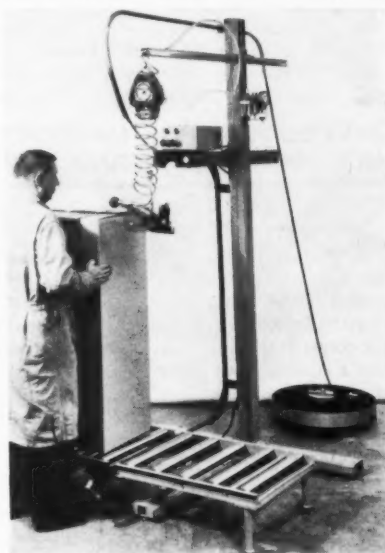
A new "clean" look and more than 30 engineering changes are incorporated in The Raymond Corp.'s current line of 2000-lb and 3000-lb-capacity electric straddle trucks. Restyled, with open masts, the new models feature full visibility. Overall weight of the uprights has been reduced 10 percent to lessen the dead weight load of the truck to increase its efficiency and lighten the drain on the battery.

A new high pressure hydraulic system increases lifting speeds and allows the use of smaller diameter rams. Control and steering handles have been redesigned for safety and greater ease in operation.

Circle No. 251 on Reader Service Card.

## High Speed Strapping Unit

A flexible, high speed strapping unit that enables one man to strap giant-size containers unassisted, and is fully ad-



justable to production line change, has been introduced by A. J. Gerrard & Co. Custom built to a customer's requirements, the Model 480 strapping unit is designed for easy on-the-spot alteration to almost any future production line requirement, and will handle all sizes of flat strapping from  $\frac{3}{8}$  in. by .015 in. to  $\frac{3}{4}$  in. by .023 in., many sizes of oval strapping, and 100 percent rayon strapping.

Circle No. 252 on Reader Service Card.

## NSTC, Inc. Appoints Four

National Safe Transit Committee, Inc. announces the appointment of four representatives of the manufacturing and

TO PAGE 112 →

# MPM

**covers all 5,000  
establishments in the  
\$11 BILLION**

**APPLIANCE and Fabricated Metal  
Products Manufacturing Industry**

## What the MPM Market Buys — \$7 Billion Worth

Over seven billion dollars are spent by manufacturers of appliances and fabricated metal products for materials, components, equipment and supplies. Of the three publications serving appliance OEM, two reach appliance manufacturers only. MPM provides depth coverage of every appliance plant in the U. S. and Canada — plus a broad group of manufacturers of similar fabricated metal products. As a result, MPM's market is double that of the appliance industry alone.

## DELIVERED COST OF MATERIALS, COMPONENTS, PARTS, CONTAINERS, AND SUPPLIES CONSUMED

	by the Appliance Industry only	by the MPM Market	Difference in Added Sales Potential
SPENT FOR PLANT & EQUIPMENT .....	\$ 88,932,000	\$ 349,391,000	+ 293%
CARBON SHEET & STRIP STEEL .....	349,127,000	899,063,000	+ 158%
ALLOY & STAINLESS STEEL .....	39,499,000	169,012,000	+ 328%
COPPER & COPPER BASE ALLOY .....	88,953,000	132,520,000	+ 49%
ALUMINUM & ALUMINUM BASE ALLOY .....	67,979,000	183,000,000	+ 169%
ALUMINUM CASTINGS .....	25,825,000	74,379,000	+ 188%
FRACTIONAL H. P. ELECTRIC MOTORS .....	198,166,000	218,918,000	+ 11%
ALL OTHER MATERIALS, COMPONENTS AND SUPPLIES .....	2,546,187,000	5,042,175,000	+ 98%
TOTAL .....	\$3,404,668,000	\$7,068,458,000	+ 108%

Source for market facts: Bureau of Census

To sell to the appliance and fabricated metal products manufacturing field—an \$11 billion market—advertise in the experienced, effective medium. Use the basic advertising buy . . .

## 233 MILLION UNITS SHIPPED

MPM's giant market produces over 233 million units. Total value, over \$11 billion. Appliances account for 100 million units, with a value of \$5.7 billion. The other fabricated metal products, including vending machines, business machines, metal furniture and other items which require the same materials, equipment and manufacturing techniques as appliances, represent shipments with a value of over \$5.2 billion. Of the three publications which concentrate on this field, only MPM reaches plants in this second vital segment. **ONLY MPM reaches the entire field.**

## MPM COVERS MORE THAN DOUBLE THE ESTABLISHMENTS

MPM's over 15,000 circulation is directed to men who buy in over 5,000 establishments in appliance and fabricated metal products manufacturing. Other "appliance industry" publications reach only some 2,000 appliance establishments. With MPM, you reach twice the number of establishments, double the potential. Included in MPM's coverage are all levels of decision-making—top management, sales management, purchasing, engineering and design, and plant management and supervision. MPM's circulation is 100% qualified under BPA audit regulations.

## MORE EDITORIAL — BETTER EDITORIAL

More information on design, engineering, marketing, statistics, plant facilities and operations, plus more industry news, means greater readership for MPM, greater impact for advertisers.

## Compare: PAGES OF EDITORIAL, 1960

METAL PRODUCTS MANUFACTURING	540 PAGES
APPLIANCE PUBLICATION B	404 PAGES
APPLIANCE PUBLICATION C	406 PAGES

MPM's 33% lead is noteworthy; even more important is the fact that its editorial is produced, researched, written and edited by the most experienced staff in the field.

## MEASUREABLE TREND TO MPM

During the past two and a half years, MPM has gained 176 advertising pages—over 4 times the gain of the second publication. The third publication shows a cumulative loss of 173 pages. For the first six months of 1961, the record is even more dramatic:

**MPM Up 37 Pages**  
**Appliance Pub. B Down 72 Pages**  
**Appliance Pub. C Down 33 Pages**



## METAL PRODUCTS MANUFACTURING

DANA CHASE PUBLICATIONS, INC.

YORK STREET AT PARK AVENUE • ELMHURST, ILLINOIS

TE 4-5280

Established 1944

NEW YORK • CLEVELAND • LOS ANGELES



# METAL PRODUCTS STATISTICS

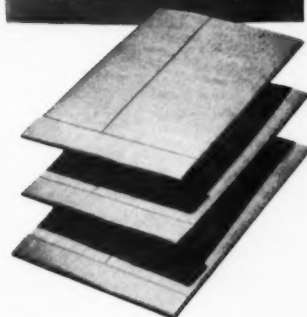
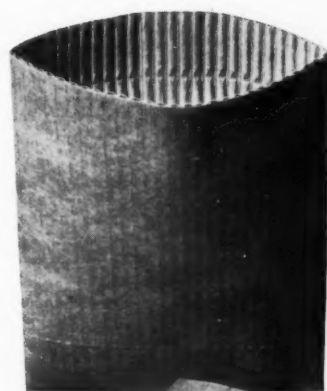
		1961 (Units)	1960 (Units)	% Change
Gas Furnaces.....	July	79,700	74,800	+ 6.6
	Jan.-July	475,800	469,600	+ 1.3
Gas Boilers.....	July	13,550	11,680	+16.0
	Jan.-July	74,285	69,621	+ 6.7
Gas Conversion Burners.....	July	10,300	9,500	+ 8.4
	Jan.-July	49,800	58,500	-14.9
Oil-Fired Central Heating Equipment.....	June	31,360	32,794	- 4.4
	Jan.-June	211,531	223,274	- 5.3
Gas Ranges, Free-Standing.....	July	88,300	84,300	+ 4.7
	Jan.-July	773,400	847,200	- 8.7
Gas Ranges, Built-In.....	July	21,800	21,400	+ 1.9
	Jan.-July	191,800	194,500	- 1.4
Gas Water Heaters.....	July	177,100	254,100	-30.3
	Jan.-July	1,542,700	1,609,400	- 4.1
Gas Vented Recessed Wall Heaters.....	July	24,500	28,300	-13.4
	Jan.-July	171,800	189,000	- 9.1
Gas Floor Furnaces.....	July	5,300	5,100	+ 3.9
	Jan.-July	30,900	36,000	-14.2
Gas Direct Heating Equipment.....	July	98,400	142,900	-31.1
	Jan.-July	450,400	548,500	-17.9
Gas Unit Heaters & Duct Furnaces.....	July	9,200	9,500	- 3.2
	Jan.-July	79,600	83,300	- 4.4
Gas Incinerators.....	July	1,800	2,200	-18.2
	Jan.-July	21,800	25,300	-13.8
Electric Household Refrigerators.....	July	304,700	297,400	+ 2.5
	Jan.-July	1,991,000	2,111,100	- 5.7
Electric Farm & Home Freezers.....	July	105,900	94,100	+11.8
	Jan.-July	598,200	647,300	- 7.6
Electric Ranges, Free-Standing.....	July	55,600	58,100	- 4.3
	Jan.-July	491,700	503,300	- 2.1
Electric Ranges, Built-In.....	July	48,400	44,800	+ 8.0
	Jan.-July	403,000	391,400	+ 3.0
Electric Water Heaters.....	July	59,400	59,600	- 0.3
	Jan.-July	433,600	435,300	- 0.4
Electric Dishwashers.....	July	41,800	33,800	+23.6
	Jan.-July	330,500	309,200	+ 6.9
Electric Food Waste Disposers.....	July	63,700	55,100	+15.6
	Jan.-July	450,700	435,900	+ 3.4
Dehumidifiers.....	July	31,600	63,500	-50.0
	Jan.-July	271,000	365,500	-25.8
Combination Washer-Dryers.....	July	5,442	8,974	-39.0
	Jan.-July	58,335	88,840	-34.0
Washers—Automatic & Semi.....	July	182,405	174,608	+ 4.0
	Jan.-July	1,381,852	1,403,460	- 2.0
Washers—Wringer & All Other.....	July	46,017	43,047	+ 7.0
	Jan.-July	370,535	416,901	-11.0
Electric Dryers.....	July	42,639	50,264	-15.0
	Jan.-July	320,109	362,592	-12.0
Gas Dryers.....	July	22,284	22,316	-
	Jan.-July	160,824	192,585	-16.0
Metal Furniture.....	July	*	*	+ 3.0
	Jan.-July	*	*	-15.0
Vacuum Cleaners.....	July	213,932	223,008	- 4.1
	Jan.-July	1,812,248	1,905,476	- 4.9
Typewriters.....	June	102,382	*	*
	Jan.-June	530,986	*	*
Room Air Conditioners.....	July	76,500	117,900	-35.0
	Jan.-July	1,276,300	1,277,800	- 0.2
Unitary Air Conditioners (1).....	Jan.-June	199,556	*	+ 8.0
Steel Barrels & Drums.....	June	2,823,567	2,815,607	+ 0.3
	Jan.-June	15,571,368	15,245,491	+ 0.2
Steel Pails.....	June	7,498,634	7,197,979	+ 4.2
	Jan.-June	38,320,444	37,935,545	+ 1.0

(1) Including heat pumps

\* Not reported

Figures represent manufacturers' shipments or sales.

Sources for this information: Gas Appliance Manufacturers Association, National Electrical Manufacturers Association, American Home Laundry Manufacturers Association, Vacuum Cleaner Manufacturers Association, National Association of Furniture Manufacturers, Electronic Industries Association, Air-Conditioning and Refrigeration Institute, and U.S. Dept. of Commerce.



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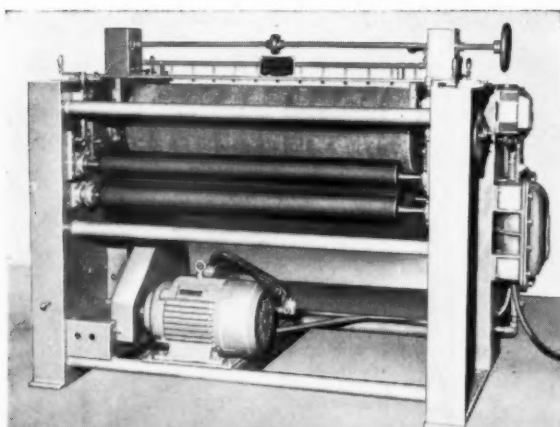
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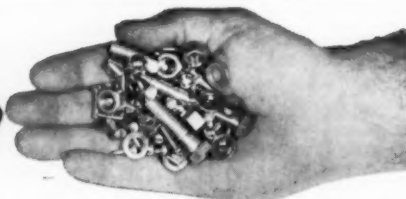
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for information contact:

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5844 North Broadway Department MPM-10 Chicago 40, Illinois

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### Motor Wheel

→ FROM PAGE 63

packaged product on an elevator section of a roller conveyor which feeds a motorized wood slat conveyor to the package closing station. (The slat conveyor not only serves for transferring the assembled mobile home furnaces to package closing, but also serves as an assembly conveyor for small room heaters.)

### Stapler used for closing containers

With the heater bolted to a wooden base and installed in the container, it travels in a vertical position on the flat conveyor with the lower flaps closed but not sealed. At the end of this motorized, wood slat conveyor, it transfers to a special piece of stapling equipment consisting of a small-diameter gravity roller conveyor into which is inserted a bottom stapling unit, and above which is located a top stapling unit.

The air operated equipment can staple a container from 6 to 60 in. One operator handles the equipment by bringing the top stapling unit down on the closed flaps of the container top at a point immediately over the lower stapling unit. By tripping a single foot pedal, both the bottom and top staplers work simultaneously.

From this stapling equipment, the heaters in the closed containers continue to a short section of skate wheel conveyors where they are picked up by a specially constructed fork lift truck which handles four containers at one time without skids.

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## NEW COATING CONTAINING GEON VINYL PUTS MORE PROTECTION ON METAL

"Freight Liner 510" protective coating is manufactured using Geon solution resins by Archer-Daniels-Midland Company, Minneapolis. B.F. Goodrich Chemical Company supplies the Geon vinyl.

B.F. Goodrich

The manufacturer of this coating for freight cars calls it "a tough, permanently elastic, non-porous plastic coating that protects exterior surfaces as no other coating material will". It is made using Geon vinyl solution resins.

There's reason for the confidence. Look at what tests have proved: two passes of pure silica sand blasted against the surface at 100 psi cut through ordinary paint to bare steel, whereas it only dulled the surface of the paint made with Geon. Geon is tough. Over 500 hours of salt spray corrosion testing had little effect on the new paint. Geon is corrosion resistant — the coating is prac-

tically unaffected by salt air corrosion, spillage from corrosive loadings, or atmospheric chemicals.

In addition, Geon provides extra weather-resistance. Exposed to over 2000 hours of accelerated weathering tests, the coating exhibited excellent color and gloss retention. There is no curling, flaking, checking or cracking.

Results like this are reasons so many manufacturers are using Geon vinyl in so many forms—as coatings, extrusions, moldings, or in rigid form. For more information, write Dept. NB-8, B.F. Goodrich Chemical Co., 3135 Euclid Ave., Cleveland 15, O. In Canada: Kitchener, Ont.

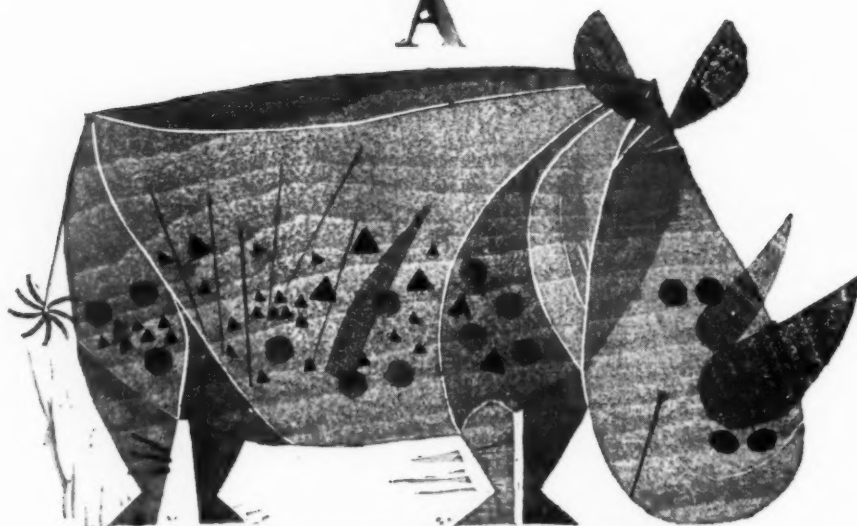
### B.F. Goodrich Chemical

a division of The B.F. Goodrich Company



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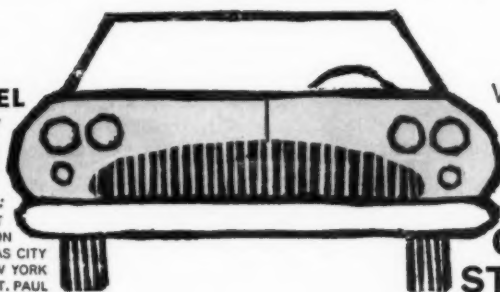
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### GENERAL

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### DESIGN

AN OIL FURNACE DESIGNED FOR  
MOBILE HOME INSTALLATION

### FABRICATION

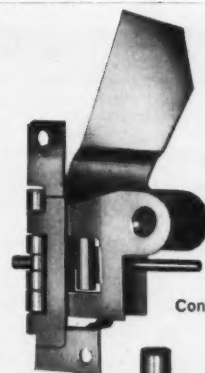
AUTOMATIC CLOTHES DRYER STAMPINGS  
PRODUCED WITH MINIMUM HANDLING

AN AUTOMATED LINE FOR FABRICATING  
UPRIGHT FREEZER CABINETS

### FINISHING

HAND FLOWCOATING PORCELAIN ENAMEL  
ON RANGE PARTS

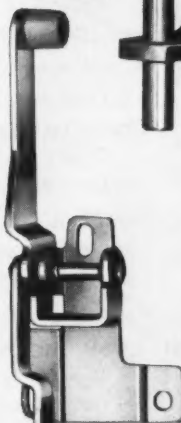
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### Safe Transit news

→ FROM PAGE 105

shipping industry to the newly founded NSTC Advisory Council. Appointed were:

**W. L. Newman**, manager, Central Packaging Laboratory, General Electric Co., Schenectady, N. Y.; **J. P. O'Hanlon**, manager, packaging, Radio Corp. of America, Camden, N. J.; **A. W. Gaulke**, sales manager, Package Development Corp., Milwaukee, Wis.; and **P. W. Bush**, superintendent, quality control, Westinghouse Electric Corp., Mansfield, Ohio.

### A world-wide view

→ FROM PAGE 103

a high degree of intelligence, flexibility and imagination; production engineers who can adapt differences in raw materials, suppliers and methods to an efficient scheme of manufacturing; marketing personnel with sufficient patience, tolerance and understanding to learn how best to distribute and sell to dealers and consumers who have traditions and habits quite different from ours; and financial experience and competence, acquired overseas, which can cope with the ever-present problem of increasing capital requirements and corporate financing.

We are optimistic about the results that can be secured. The development of these rapidly growing enterprises in varied and differing environments in a dozen or more countries around the world is enough to keep the most imaginative and restless individual fully occupied and intrigued.

**EDITOR'S NOTE:** Mr. Skinner presented a paper on this subject at the 1961 annual convention of the American Home Laundry Manufacturers Association. Because of the widespread interest in this topic, MPM editors asked Mr. Skinner to prepare this article for MPM readers.



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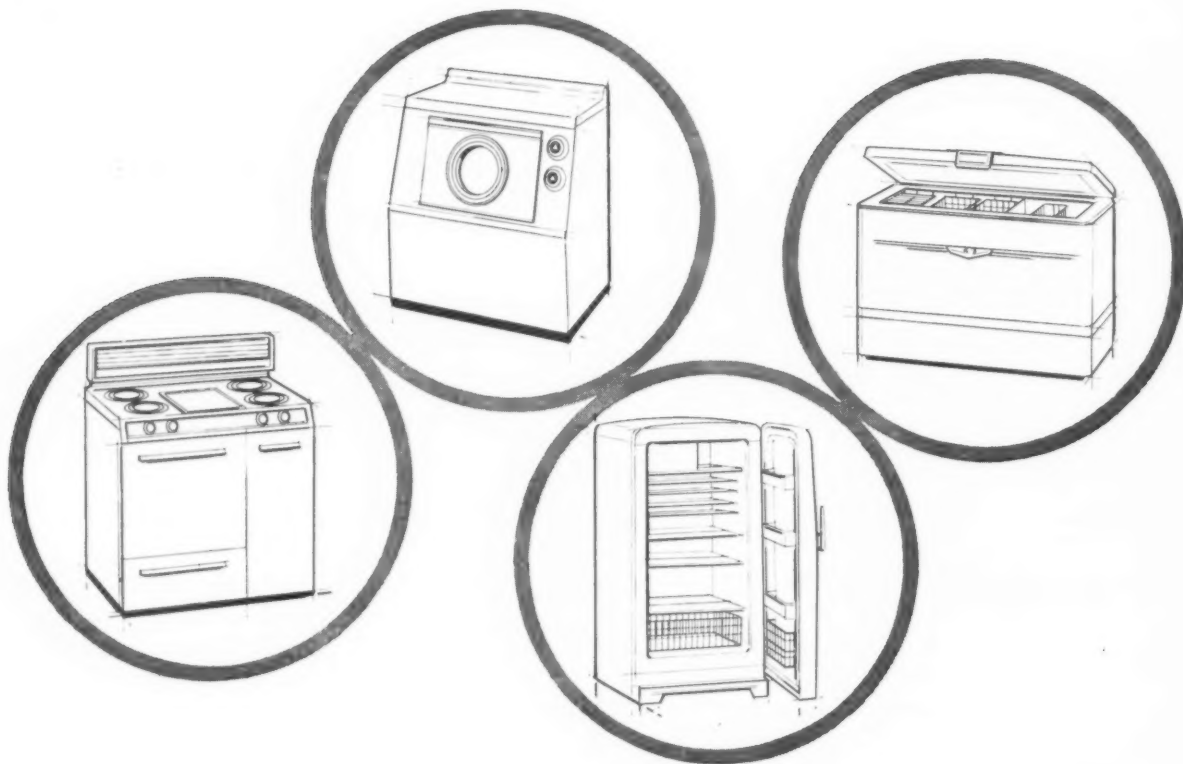
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**I** OF A SERIES  
NOTES FROM A DESIGNER'S SKETCH BOOK



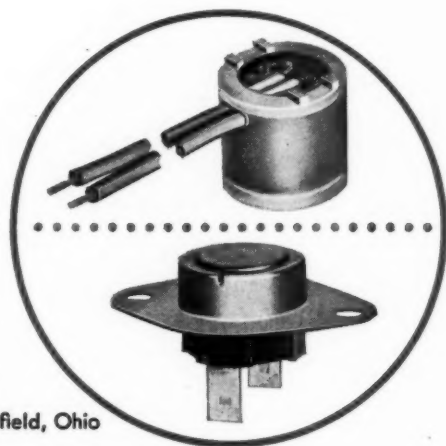
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